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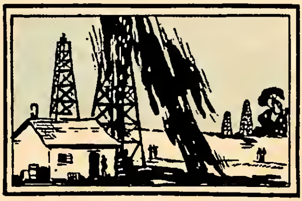
Louisiana Conservation REVIEW



Fisheries of Louisiana

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Rise and Fall of Tides—Magnetic Observations

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Atchafalaya Deer

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Effect of Shutdown of Oil Wells

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Tallest Tree Dedicated

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Sanctuary

Published Monthly by the
DEPARTMENT OF CONSERVATION

JANUARY
1932

Rich in - - -
Raw Materials

Louisiana is rich in natural resources . . . timber, salt and sulphur . . . cotton . . . cane . . . rice . . . oil and an ABUNDANCE OF NATURAL GAS. Manufacturers seeking sites for new ventures or new locations for old ones find all their perplexing problems settled in the Pelican State. For not only do its resources offer every possible inducement, but its splendid railroads and highways make distribution easy. The Arkansas Louisiana Pipeline Company and the Arkansas Fuel Oil Company, because of their faith in this territory, are keeping in line with Louisiana's progressive march by developing natural resources.

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VOL. II. NEW ORLEANS, LA., JANUARY, 1932 NO. 4

Louisiana Conservation Review

Published monthly by the Department of Conservation in the interest of protection and proper utilization of Louisiana's natural resources.

JAMES P. GUILLOT . . . . Editor
N. E. SIMONEAUX . . Assoc. Editor
WM. G. RANKIN . . Business Mgr.

CONTENTS

Titles	Page
Fisheries of Louisiana.......	3
Tarpon Fishing on the Coast of Southern Louisiana.....	9
Rise and Fall of Tides Recorded by Scientists.......	11
Atchafalaya Deer	12
Oil Conservation Board Discusses Probable Effect of Shutdown of Wells.........	14
Louisiana Nature Guardians.	22
Control of Predatory Animals in California	25
Forestry's Relation to Public Welfare	27
Oysters Declared Year Around Food	29
Louisiana Tree Seedlings....	29
Tallest Tree Dedicated......	31
Sanctuary	33
Study of Waste Gases Leads to Rich By-products.......	40

Commissioner Maestri's Appeal

THE GEORGE WASHINGTON BI-CENTENNIAL will doubtless be remembered in proportion to the efforts we put forth in carrying out the very appropriate Tree Planting Program, as sponsored by the American Tree Association.

Commemorating President Washington's Bi-Centennial, Louisiana, with its rich variety of trees, nurtured by a climate and soil unexcelled, has an opportunity to lead the nation in its 1932 observance of Arbor Day. What greater honor can a citizen and child of today pay to the memory of the Father of our Country than to plant and care for a living monument about the home, the school, the church, the community square, the street, and the highway?

As the Tree Monument grows and ripens into age for use, be it for shelter, fuel, or commerce, its beauty and romance instinctively strike charm and blessing on man and his subordinate creatures.

Throughout the Scriptures we find the tree a symbol of prominence. The Druids and poets of old regarded trees as the temples of God,—a conception which today the lover of nature still entertains. In going through Sequoia National Park, the traveler is overwhelmed by the presence, solemnity, and majesty of trees that are between 3,000 and 4,000 years old. These have occupied the west slopes of Sierra Nevada while great nations have risen with pomp and ceremony and later have passed away, while numerous wars have been fought, and while dynasties have come and gone. Their dignity and majesty are beyond that of any other living object.

What appeals more to one's aesthetic taste than God's glorious company of trees where "healing shade is laid upon a fevered world," where the traveler's parching tongue and limb find rest and "feel the dew of dawn still wet beneath his feet," and so "forget the burning highway's ache and fret"?

May we not hope that this memorable occasion will prompt every Louisianian to organize and co-operate with the Department of Conservation in its endeavor to make Washington's 1932 birthday celebration the greatest and most cherished in the history of our country.

As Commissioner of Conservation, I, therefore, appeal to all citizens and organizations of this state to join with us in common contribution in realizing the object and purpose of the American Tree Association Program.

Pennsylvania Prohibits Sale of Bass in State

THE sale of large and small mouth bass caught in waters within or without this Commonwealth, or received in interstate commerce or otherwise, is prohibited by provisions of a bill which Governor Gifford Pinchot has approved.

The present law prohibits the sale of trout, and a great many of the sportsmen's organizations throughout the Commonwealth were interested in having a similar bill for bass enacted, Commissioner of Fisheries O. M. Deibler said. He said also that the Federal authorities had requested the enactment of such a law, so that it would tie in with their law prohibiting the interstate transportation of bass.

A Tree's Family Tree

THERE are many family trees, highly regarded by present-day twigs, that are of less real interest to the world than are the family trees of certain distinguished trees, for example, the Napoleon willow. This example of the "salix babylonica" was planted so that it would bow its limbs as in tears above the tomb of the mighty Napoleon, down there in the Southern hemisphere on the islet of St. Helena. After the Little Corsican's remains had been removed to the Invalides in Paris, there to repose beneath the great dome, and surrounded by scarred battle flags of his many campaigns, neglect, unless it was unavoidable infection, destroyed the tree. But this was not before there had been time for admirers of the deceased emperor to carry away cuttings of the imperial salix and to set up branches of the tree family in many parts of the world, branches that have spread and developed, until there is now no longer danger that the breed ever will perish from the earth. The only real hazard now is that many a weeping willow on far corners of our globe actually will be born to weep without ever knowing that it is of true Napoleonic willow ancestry.

In England it is well known that one son of the original, developed from a cutting brought back in 1821, has grown into "a fine strapping tree" at Broxbourne Mill beside the Old North Road, just outside of London. Two grandchildren stand at West Norwood.

Commissioner Maestri Undertakes Geological Survey of State

THE study entitled "Geology of Iberia Parish," which is now in process of publication, should prove to be one of the most valuable works on the natural resources of Louisiana ever produced. The volume was prepared by Dr. H. V. Howe, director of the school of Geology of Louisiana State University, and Cyril K. Moresi, of the Minerals Division of the Conservation Commission, and represents several months of tedious research in salt dome literature, and the causes of the formation of salt domes, in one of the best known salt regions of the world.

The Bulletin is one of a proposed series, the purpose of which is to make available to the public information concerning the geology of Louisiana. Since the abolishing of the Louisiana Geological Survey, in 1909, very little has been published in such a form as to be generally available. During the past 22 years numerous companies have explored and exploited the mineral resources of the State, and some of their discoveries have been recorded in professional papers. The Minerals Division of the Conservation Commission has wisely undertaken the project of compiling this material, along with more recent discoveries, and of publishing this information as a series of Bulletins.

The new Bulletin deals at length with salt dome literature, and contains, perhaps, the most complete bibliography ever published on the subject, which alone justifies the publication of the study. In addition, the topography, drainage, elevations, and stratigraphy of Iberia Parish are fully discussed. Finally, the work includes an extensive treatment of the salt domes of Iberia, with special reference to the origin of salt, the evidence of sedimentary origin, the age of the salt deposits, and the volume of salt in the domes of that Parish.

The series of Bulletins on the geology of Louisiana will be treated by parishes, of which Iberia Parish was selected as the first, because of its vast mineral resources, and its important position in the salt dome literature of the world. St. Martin will be the second parish to be studied.

Dr. Howe and Mr. Moresi have done a scholarly piece of work, of lasting value to the State, for which they deserve much credit. As a result of this Study, the people of Louisiana will have an opportunity to familiarize themselves with the geology of the State, and no doubt further research into Louisiana's resources will be stimulated.

Fisheries of Louisiana - -

By R. H. FIEDLER
Chief, Division of Fishery Industries, U. S. Bureau of Fisheries.

THE FISHERIES of Louisiana rank as one of the State's most important natural resources, and play an important role in its economic welfare. They provide sport and recreation for about 38,000 anglers, and profitable employment for over 8,000 commercial fishermen and persons engaged in transporting fishery products from the fishing grounds to market, in the wholesale trade, and in preserving fishery products. In other words, about one out of every 40 persons in Louisiana has some interest in the fisheries of this State. This number would be increased considerably if persons were included who are engaged in the retail sale of fishery products, or in the building of fishing boats, vessels and gear, and in the manufacture and sale of anglers' supplies.

PRODUCTION

The annual production of the commercial fisheries in Louisiana, according to the latest figures available, amounts to about 73,700,000 pounds, valued at $3,400,000. Of this amount 61,900,000 pounds, valued at $2,800,000, are taken in the marine fisheries, and 11,800,000 pounds, valued at $600,000, are taken in the interior rivers and lakes. Detailed statistics on the production by species and waters is shown in Table 1, and graphically for the most important species in Figure 1. From these it will be seen that, while about 35 fishery products are taken commercially, seven account for about 97 per cent of the total volume of the catch, and 92 per cent of the total value.

Shrimp is by far the most important product taken. In fact, the fisheries of the State are concerned primarily with the production of this seafood, which has an annual yield of nearly 50,000,000 pounds. This is 44 per cent of the annual catch of shrimp on our entire Atlantic and Gulf Coasts. Shrimp are used mainly for canning and drying. Of second importance are oysters, with an annual production of about 7,900,000 pounds of meats. In addition, about 10,300,000 pounds of oyster meats, valued at $280,000, are obtained annually from oysters taken by Mississippi vessels on beds in Louisiana. A large part of these find their way into cans. The third most important species taken is buffalofish, with an annual production of 5,000,000 pounds. Large quantities of this fish are marketed to the Jewish trade in the Middle West, and in such large eastern cities as New York City, and Philadelphia. The production of catfish or bullheads amounts to over 3,300,000 pounds annually, and makes the fourth most important species. Large quantities of these fish are marketed locally, and also in the Mississippi River basin. The production of crabs is of fifth importance, and amounts to about 2,700,000 pounds annually. These are marketed largely near centers of production, as is the fresh-water drum, the annual production of which amounts to about 1,400,000 pounds, making the latter species of sixth importance. Mussel shells are of seventh importance, with an annual production of 1,300,000 pounds. These are used in the manufacture of mother-of-pearl buttons, and novelties. The annual yield of all other products combined amounts to about 2,500,000 pounds.

IMPORTANCE OF FISHERY STATISTICS

The above article was prepared from figures collected by the U. S. Bureau of Fisheries. This bureau now makes an annual statistical canvass of the marine fisheries of the State, whereas formerly these were made at irregular intervals. This has been made possible through co-operation with the Louisiana Conservation Department and with the fishing industry of the State, and also by the bureau having increased funds at its disposal.

While it has been possible to make an annual canvass of the marine fisheries during late years, statistics have not been collected by the bureau on the fresh-water fisheries since those obtained for the year 1922, except for the production of mussel shells for 1929. However, the bureau has a limited fund at its disposal during the present fiscal year with which it plans to make a canvass of the fresh-water fisheries for 1931. It is expected that this canvass will be started sometime early in 1932. It is urged that the trade co-operate with the bureau to supply the desired information to expedite the survey. It is doubtful whether the fresh-water fisheries can be canvassed annually thereafter by the bureau. However, this will be determined by the extent of the local co-operation and funds available for this work in the future.

The fresh waters of Louisiana contain many species of game fish. If these are to be conserved intelligently, reliable annual figures are needed on the commercial production, so that conservation regulations can be promulgated wisely. Such a series of figures is now being accumulated for the marine fisheries through the annual statistical canvasses. These, in combination with biological studies, are used for outlining regulations. For instance, the bureau, in co-operation with the Louisiana Conservation Department, is making an intensive biological study of the shrimp fishery which, as previously related, is of great economic importance to the State. It is expected that as a result of this statistical and biological study wise regulatory measures will be recommended to conserve the species, if the facts assembled reveal this to be necessary. Without statistics as a basis intelligent regulations could not be recommended

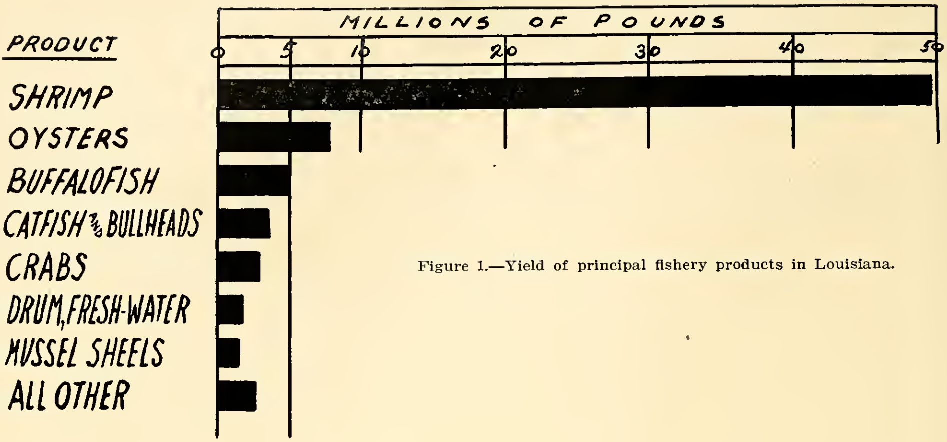


Figure 1.—Yield of principal fishery products in Louisiana.

TABLE 1.—YIELD OF FISHERY PRODUCTS IN LOUISIANA

Species	Marine‡		Rivers and Lakes*		Total	
	Pounds	Value	Pounds	Value	Pounds	Value
Shrimp	49,455,982	$ 2,025,336	142,182	$ 13,870	49,598,164	$ 2,039,206
Oysters	7,899,669	438,410			7,899,669	438,410
Buffalofish			4,938,777	222,944	4,938,777	222,944
Catfish and bullheads			3,281,305	209,677	3,281,305	209,677
Crabs, hard and soft	2,755,288	103,183			2,755,288	103,183
Drum, fresh-water			1,439,368	52,633	1,439,368	52,633
Mussel shells			1,308,000	24,000	1,308,000	24,000
Drum, salt-water (red and black)	711,230	59,041			711,230	59,041
Squeteague or "sea trout"	512,768	70,748			512,768	70,748
Paddlefish and caviar			428,386	50,516	428,386	50,516
Frogs			217,372	17,419	217,372	17,419
Sheepshead, salt-water	100,507	9,741			100,507	9,741
Croaker	80,647	3,330			80,647	3,330
Red snapper	80,000	10,400			80,000	10,400
Mullet	69,491	3,496			69,491	3,496
Terrapin	67,000	26,100			67,000	26,100
King whiting or "kingfish"	41,829	2,092			41,829	2,092
Carp, German			41,630	2,555	41,630	2,555
Spot	41,496	2,292			41,496	2,292
Flounders	25,389	2,641			25,389	2,641
Turtles			20,786	2,181	20,786	2,181
Alligator hides			15,616	2,673	15,616	2,673
Jewfish	10,000	4,000			10,000	4,000
Spanish mackerel	9,110	929			9,110	929
Crawfish			7,265	509	7,265	509
Garfish			4,170	76	4,170	76
Groupers	4,000	240			4,000	240
Yellowtail	1,175	47			1,175	47
Eels			1,100	100	1,100	100
Pompano	808	231			808	231
Suckers			400	28	400	28
Sturgeon, shovelnose			280	25	280	25
Bluefish	167	28			167	28
Bonito	150	30			150	30
Sea bass	150	15			150	15
TOTAL	61,866,856	$ 2,762,330	11,846,637	$ 599,206	73,713,493	$ 3,361,536

‡Figures for 1929.

*Figures for 1922 except those for mussel shells which are for 1929, as well as for a small amount of the catfish and bullheads and of the garfish.

Source: Bureau of Fisheries.

TREND OF CATCH

Marine Fisheries: During the one-half century from 1880 to 1929, the United States Bureau of Fisheries made twelve statistical canvasses of the production of salt-water species in the marine fisheries of Louisiana. During this period the trend of the catch has been steadily upward. Beginning with the catch of about 6,400,000 pounds in 1880, it increased to nearly 17,000,000 pounds in 1889. A slight decrease then occurred until 1897, when the catch amounted to about 15,000,000 pounds. From then on the catch increased at an unusual rate, reaching a peak of 69,000,000 pounds in 1928. The next year it decreased from this figure slightly, to a production of about 62,000,000 pounds.

A glance at Table 2 and Figure 2 reveals that the total catch of the marine fisheries is influenced almost entirely by the production of shrimp. As will be noted, when the catch of shrimp increased, the total increased, and vice versa. Whether this condition will continue in future years, can not be determined at this time.

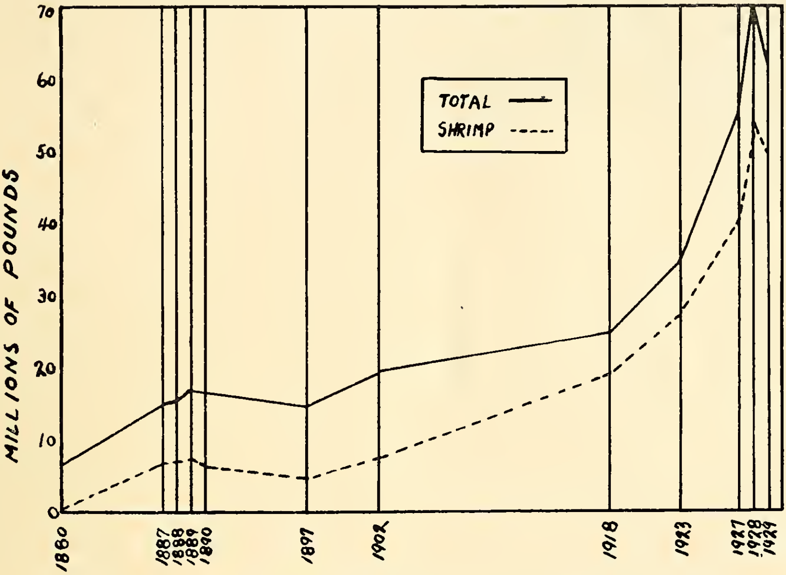


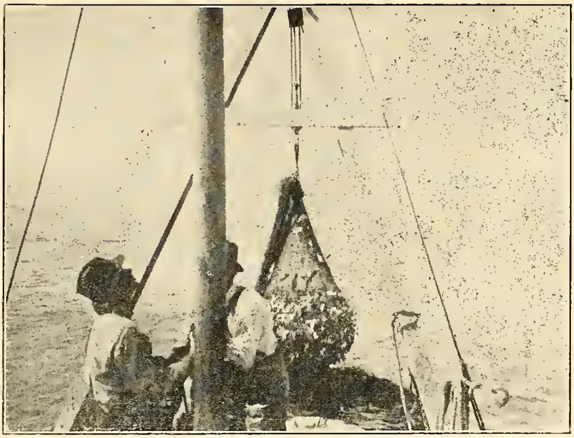
Figure 2.—Yield of salt-water fishery products in the marine fisheries of Louisiana, 1880 to 1929.

TABLE 2.
Yield of salt-water fishery products in the marine fisheries of Louisiana compared with the yield of shrimp in Louisiana 1830 to 1929.
(Expressed in thousands of pounds; that is, 000 omitted.)

Year	Shrimp	Total
	Quantity	Quantity
1880	534	6,442
1887	6,810	14,744
1888	6,943	15,253
1889	7,238	16,754
1890	6,662	16,334
1897	4,487	14,692
1902	7,635	19,568
1918	18,250	24,469
1923	27,753	34,722
1927	40,259	55,403
1928	53,779	69,155
1929	49,456	61,867

Source: Bureau of Fisheries.

In this connection it is interesting to note that the crab fishery is assuming greater importance. Although the production of this fishery is small at present, compared with the production of similar fisheries in some other sections of the country, especially in Chesapeake Bay, it is believed that when more extensive markets are found for locally caught crabs, by Louisiana dealers, the catch will increase to enormous proportions. Scientific observers of the United States Bureau of Fisheries have found that at some places along the coast of Louisiana, especially at Grand Isle, blue crabs are relatively abundant, and that this resource is not utilized to its fullest extent. Possibly this is due to the fact that crabs can not compete with the shrimp for local markets, as the cost of production of shrimp is lower and therefore can retail at a lower price than crabs, which



Hoisting shrimp otter trawl.

are relatively expensive to catch. However, it is believed that a market for crabs and crab meat taken in Louisiana could be found in the Mississippi River area. With improved methods for packaging and refrigeration, fresh crabs and crab meat can now be shipped over long distances, with assurance that the product will arrive in good condition. Also, with improved technique crabs can be successfully canned. Development of a large crab fishery should be especially desirable to fishermen during the late spring and summer months, when there is a comparative scarcity of shrimp in local waters. This would give the fishermen a source of income at a time of the year when it would be most welcome, and at the same time enable wholesale establishments and fishing plants to operate over a longer season.

Fresh-water Fisheries: Figures on the fresh-water fisheries of Louisiana, as collected by the United States Bureau of Fisheries, are available for only three years, 1894, 1899, and 1922. For this reason any discussion of the trend of the catch in these waters must necessarily be limited. It will suffice to state that the catch amounted to somewhat over 6,000,000 pounds in 1894, declined to about 2,000,000 pounds in 1899, and then increased to about 12,000,000 pounds in 1922. During these years buffalofish and catfish have been the most important species taken. During the past few years the mussel-shell fishery came into prominence in the interior waters of Louisiana. In 1929 this fishery produced 1,300,000 pounds of muscle shells. These are used for the manufacture of mother-of-pearl buttons, and novelties. It is possible that this fishery will expand to larger proportions in Louisiana to augment the supply of mussel shells, which is rapidly declining in some other sections of the country.

METHODS OF CAPTURE

According to the latest figures, ten types of gear are used by about 5,800 commercial fishermen in the capture of fishery products in Louisiana, although three of these types of gear make practically the entire catch. Of most importance is the otter trawl. These are bag-shaped nets, which are drawn slowly over the bottom behind the stern of fishing craft. They catch most of the shrimp. Haul seines are of second importance, and are used mainly for the capture of buffalofish and shrimp. Tongs are of third importance, and are used to take most of the oysters.

In the marine fishery 103 motor vessels are operated, having a combined capacity of 741 net tons. In addition, 2,305 motor and other small boats are used. In the fresh-water fishery 2,924 motor and other small boats are used in fishing.

LOCALITY OF CAPTURE

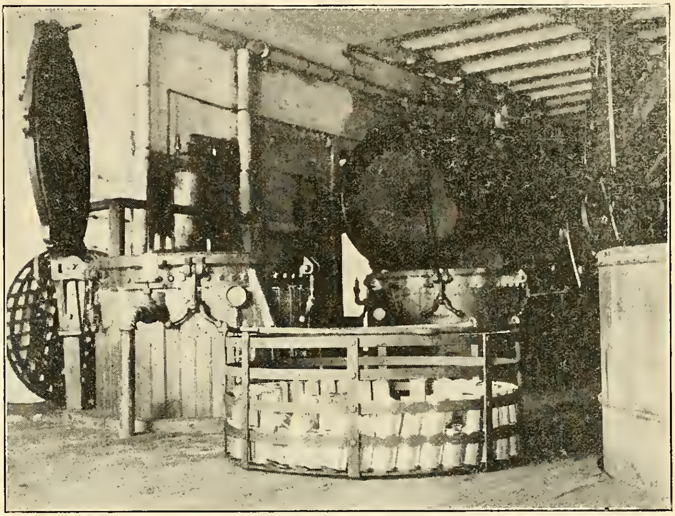
Commercial fishing is carried on in marine waters of 14 parishes in the State, and in practically all those on its principal rivers and lakes. In the marine sections La Fourche and Jefferson Parishes are of most importance, the combined

Steam cars filled with oysters.

catch of these parishes accounting for about one-half of the total volume and value of the saltwater fishery products taken in the State. Other important marine parishes in point of value are Terrebonne, Plaquemines, Orleans, and St. Bernard. In the fresh-water fisheries, Atchafalaya River is of most importance, the volume and value of the catch in this river accounting for nearly one-half of the total of fish taken from interior waters. Other important interior waters are Lake Larto, and the Black, Red, and Mississippi Rivers.

TRANSPORTING TRADE.

After being caught certain fishery products are transferred to transporters or freight boats which carry them to port. This method is used to a considerable extent for delivering the catch of the oyster fishery. According to the latest figures there are 472 persons engaged in the transporting trade in the marine fishery. They use 83 vessels having a combined capacity of 633 net tons, and 214 small under-tonnage boats. In the fresh-water fisheries the transporting trade is conducted by 7 persons, who use 3 vessels having a combined capacity of 32 net tons.


Processing tank, oyster cannery.

WHOLESALE TRADE

Fresh and frozen fishery products taken in the State are marketed by 61 wholesale establishments in Louisiana, according to the latest figures. Of this number 33 are located in the marine district, and 28 in the interior. Thirteen of these are located in Orleans Parish, many of which have their place of business in the old French market in New Orleans. This market is noted for its seafood establishments, and persons desiring local as well as out-of-the-State products, generally find their wants supplied here. In the marine district Terrebonne Parish is of second importance, having nine establishments. The remainder in the marine district of the State are located in Jefferson, La Fourche, Calcasieu, Plaquemines, and St. Tammany Parishes. Most of the wholesale firms engaged primarily in handling species of fresh-water fish are located at Lake Larto, and on the Red, Black, Atchafalaya, and Mississippi Rivers. The wholesale establish-

Tonging oysters.

ments in the State, according to the latest figures, were conducted by 56 proprietors, and employed 459 salaried employees, and wage earners, who received $418,546 in salaries and wages.

MANUFACTURING INDUSTRIES

The manufacture of fishery products in Louisiana is devoted primarily to the canning of shrimp and oysters, and to the manufacture of poultry feed and lime from reef and other oyster shells. There are 56 establishments engaged in the various manufacturing industries, which annually produce commodities valued at nearly $5,000,000. Shrimp canning is of most importance. This is carried on mainly in the winter and spring months, as relatively small catches are made during the other months of the year. The canning of shrimp dates back to 1867, when G. W. Dunbar made the first attempt to can this delectable crustacean at New Orleans. Since that time the industry in the United States has grown tremendously, until it now utilizes about 50,000,000 pounds of shrimp annually for canning.

The canning of shrimp is now fairly well standardized. Upon arrival at the cannery the shrimp is unloaded and stored in ice until ready for use. This facilitates the removal of the meat. In preparing shrimp for canning the head and shell are removed or "peeled," leaving the fleshy portion or meat. This then is blanched or boiled in salt water for several minutes, which turns the meat from a slightly gray color to a bright red or pink. As soon as cooled the meats are packed in cans or glass jars of various sizes, sealed and processed at 240° F. for various lengths of time, depending upon whether packed wet or dry. In 1929 canneries in Louisiana produced 156,975 standard cases of dry packed shrimp (equivalent to forty-eight 5-ounce cans), and 269,651 cases of wet-packed shrimp (equivalent to forty-eight 5¾-ounce cans), with a combined value of $2,546,039. Canned shrimp is marketed mainly in the United States, although considerable quantities are exported.

Not all of the shrimp is canned, as large quantities are marketed fresh, pickled, dried, and frozen. Also, the offal or refuse from cannery operations is manufactured into shrimp meal or bran, which, when properly made, is valuable in a cattle ration. In 1929, 1,295 tons of shrimp, valued at $1,036,432, were marketed dried, and 2,146 tons of shrimp meal, valued at $61,876, were made from the offal or refuse. Dried shrimp is marketed mainly in the Orient, where it is considered a delicacy. Large quantities of shrimp are frozen, and find a ready sale in this country. England is especially fond of this product, where it is marketed as prawn.

Frozen packaged shrimp is becoming of importance in the trade in other States, and this method of preparation might be adapted to the industry in Louisiana. By this method the shrimp meat is frozen in cardboard containers which hold 1, 5, 10, or 12½ pounds. The smaller packages are of convenient size for home consumption, while those of larger size are adaptable for the hotel and restaurant trade.

Of second importance in the manufacturing trade is the canning of oysters and the manufacture of poultry feed and lime. The canning of oysters, which had its inception in 1815 in New York City, near the present site of Battery Park, as a result of experiments by Thomas Kensett and Ezra Daggert, is carried on in Louisiana during the season from September to April inclusive. Oysters for canning are obtained by tonging from the beds and then transported to the cannery. Upon arrival there they are dumped into latticed steel crates mounted on wheels, which are known as "steam cars." The oysters are then washed to remove mud and dirt and passed into a steam box, where they are heated at a pressure of about 10 pounds for 5 minutes. This causes the shells to open, making it easier to shuck out the meats. After shucking, the oyster meats are washed and placed in cans to which a small amount of brine has been added. The cans are then exhausted for about 5 minutes and processed at 240° F. for 12 or 15 minutes, or longer, depending upon the size of the can. After processing they are cooled immediately, as it is understood that gradual cooling tends to toughen the meat. The production of canned oysters in Louisiana in 1929 amounted to 33,259 standard cases (equivalent to forty-eight 5-ounce cans), valued at $166,990.

In 1929 Louisiana produced 124,910 tons of poultry feed, and 10,543 tons of lime, from reef and other oyster shells. The combined value of this output was $1,131,003. Reef shells are taken from deposits of dead oyster shells which have been built up through thousands of years. These are brought to the surface by powerful dredges and loaded on barges for transport to the shore plant. Here they are washed, crushed in small bits, and bagged. The resultant product is high in calcium carbonate, and is marketed for poultry feed.

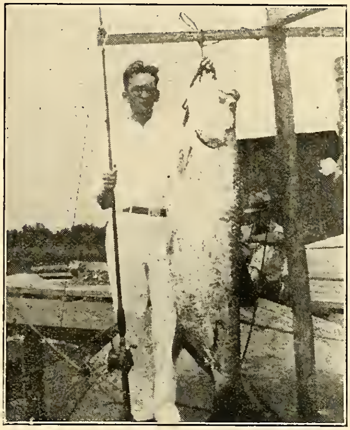
In addition to the above manufactured products, Louisiana produced 31,400 pounds of dried squeteague, valued at $7,850.

(*Continued on page* 26)

Tarpon Fishing on the Coast of Southwest Louisiana - - - -

By
B. W. Marston

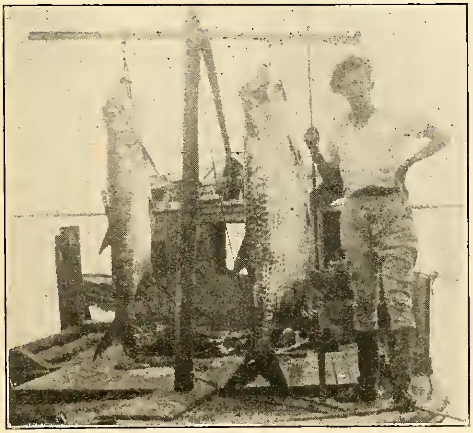
The writer's attention was attracted to an article in your valuable magazine, some time last year, about tarpon fishing in the Calcasieu River near Cameron, Louisiana. In company with some friends from Memphis, I have been going to Port Aransas, Texas, about twice a year for the past ten years, to enjoy the sport of tarpon fishing. However, after reading over the article in your magazine, we all decided about the middle of this month (September) to try out the tarpon fishing in the Calcasieu River, and it gives me a great deal of pleasure to say that we found equally as good fishing on the coast of our own State as we have found at Aransas Pass, which is known all over the United States for this sport.



Tarpon caught by B. W. Marston of Shreveport, Louisiana, in the Calcasieu River, 2 miles north of Cameron, in September, 1931.

Tarpon fishing in the Calcasieu River is best, in our opinion, about two and one-half miles up the river from the Cameron ferry, at a point known as the Southwest Pass, where the river is partially diverted into the lake immediately north.

We left the town of Cameron on a small shrimp boat, early in the morning, with three skiffs in tow, and after journeying up the river about two miles, to a point near the Southwest Pass known as "Twin Reefs" (oyster reefs), as described in your article, we saw the most unusual sight that we had ever beheld in tarpon fishing. The river, about half a mile in width, was literally covered, from bank to bank, with a school of mullet. The tarpon were feeding on the mullet, and it was no unusual sight to see five or six tarpon springing into the air at the same time, as they attacked the mullet. The sun was shining brightly at the time, and with their silver sides reflected against the sun, it was indeed a beautiful spectacle from a sportsman's point of view.



Tarpon caught in the Calcasieu River at the Twin Reefs, 2 miles north of Cameron, in September, 1931, by parties from Memphis and Shreveport.

We immediately unfolded our tackle, after reaching the place, and, having, already got some mullet for bait, we baited our hooks, and began to troll from the skiffs with our lines out about sixty feet. Naturally, seeing so many tarpon, we expected that we would "hang one" instantly, but to our surprise this did not take place, and we soon realized that our bait was only one in a million of the school of mullet in the river at that time for the tarpon to feed upon. However, our patience was not so easily expended, and within an hour the school of mullet had disappeared, and we began to get strikes, landing two tarpon amongst the three of us in that forenoon, and having an average of about three strikes each.

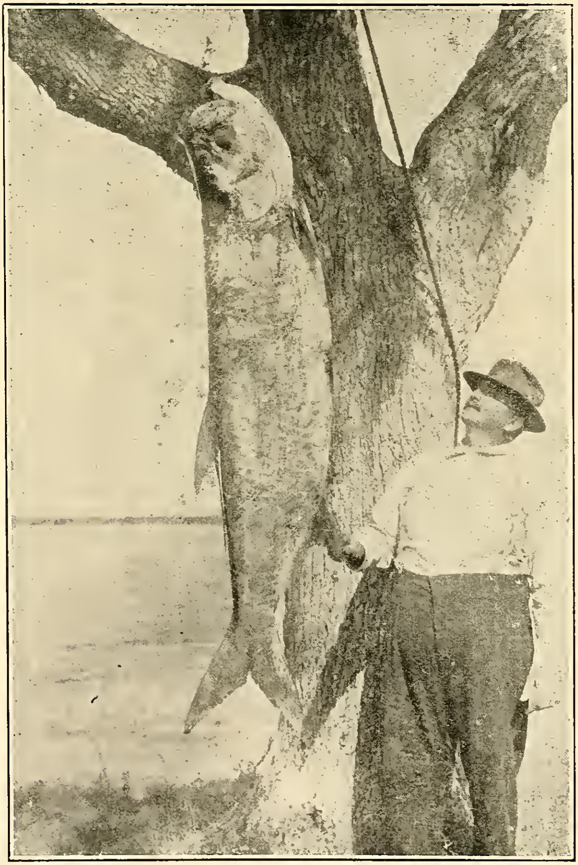
We went in to Cameron about noon for lunch, but returned to the same spot immediately after, and the writer succeeded in landing four tarpon that afternoon, in addition to having five other strikes. We remained at Cameron about four days, and landed two or three tarpon a day each. An average of one tarpon out of three strikes is considered by most sportsmen as being a fair average to land.

We used vom Hofe reels and hooks, with No. 18 line. The writer had his line parted on three occasions by extra large tarpon, and would advise anyone fishing there to use No. 24 line.

The fishing in Calcasieu River, however, is not all of the story. Anyone stopping at the hotel in Cameron can drive in an automobile, in 45 minutes, to the ferry, on the Mermentau River, which is about five miles from its entrance into the Gulf, and from there to the mouth of the river should be excellent tarpon fishing at favorable points.

Immediately south of the ferry landing (about a quarter of a mile), there is an old lock and dam, put in there years ago by the Government, but which have since been blown out by dynamite to allow the passing of boats. The remaining obstruction in the river makes a slight fall that the fish must pass over, and also makes a favorable place for the congregating of mullet; and it just appealed to me as the most favorable looking spot I had ever seen for a tarpon fisherman to get a strike.

I drove there twice from Cameron and got strikes, and had my line parted both times within less than half an hour after baiting my hook. I am informed by the natives who live there, that the tarpon are there all the time, and at favorable times are there in large numbers. I am also informed that immediately down the river, where it empties into the Gulf, is the only sand beach where clear water can be found to bathe in on the whole Southwest Louisiana coast. The writer intends to verify this on his next trip.



To the devotee of big game fishing Louisiana offers unexcelled sport. This Silver King, as the Tarpon is known to anglers, measured over seven feet in length and was caught within the city limits of New Orleans.

I might add, for information, that the town of Cameron has been almost isolated for a great many years, and the only way to reach the place was by steamboat from Lake Charles; but recently a shell road has been built to the river front opposite Cameron, and a most excellent ferry is in operation, and after crossing the river the road extends south to the Mermentau River, previously referred to.

I also want to say that the hotel accommodations at Cameron, although simple, are excellent, and reasonable. In fact, the food, particularly the several varieties of sea food, cannot be surpassed anywhere I have ever been. Also, it is easy and comparatively inexpensive to get the necessary boats and guides.

This article is written with the idea that other Louisianians who love tarpon fishing will get acquainted with this new place to enjoy the sport, which has only been made accessible by the building of the road referred to in the last few months.

Never in sport endanger human life.

Never kill wantonly or needlessly or brutally.

Obey the laws of State and Nation, work for better laws, and uphold the law-enforcing authorities.

Respect the rights of farmers and property owners, and also their feelings.

Always leave seed birds or game in cover.

Rise and Fall of Tides Recorded by Scientists

Making of Magnetic Observations Also Included in Activities of Coast and Geodetic Survey

BY CAPT. R. S. PATTON
Director, Coast and Geodetic Survey, Department of Commerce

THE necessity for a knowledge of the tides led to tidal observations, and investigations, by the Coast and Geodetic Survey, naturally followed by similar studies regarding currents.

Field data are obtained from the Bureau's 28 primary tide stations on the Atlantic, Gulf and Pacific coasts, from temporary tide stations operated by hydrographic parties, and as a result of special tide and current surveys. At these primary stations, located at important ports, or strategic points, automatic gauges are in continuous operation, furnishing a precise record of the rise and fall, and any unusual features for study. Beginning with 1922, a comprehensive tide and current survey has also been made annually of an importat harbor or waterway.

These data are utilized for datum planes on charts, bench marks, and as a basis for publications on tide and current predictions, special harbor information, and current charts. Harbor improvements, shore protection, and the erection of shore structures, necessitate a knowledge of the mean sea level, as well as the levels to which mean low water, mean high water, and story high water attain. For this purpose, bench marks are conveniently established, the elevations of which, with regard to these various datum planes, have been determined.

When the necessary constants (representing the different components for each constituent tide, or current) have been determined, from the field data, the rest of the work is executed by means of a large supercalculating machine, which not only indicates on its face dials the predicted high and low tides, or slack and strength of currents, for any given place for which it is set, for any day in the year, but also traces a continuous graph of the variations of the tide, or the current.

Tide tables, and current tables, are published annually in advance for the Atlantic and Pacific coasts, as well as convenient pocket-size local tables for important harbors. New means are constantly being found to present data available, as indicated by a new series of current charts. Each of these contains 12 charts, indicating the direction and strength of the current for each tidal hour—information of value not only to the mariner in a crowded harbor, but also to the bridge builder, the sanitary engineer, and for similar technical purposes.

The necessity for a knowledge of the deviation of the compass led to magnetic investigations, and the determination of declination, and other magnetic elemets, while undertaken primarily to meet the needs of the mariner, now find a wide variety of applications.

In the field of terrestrial magnetism, and seismology, the Coast and Geodetic Survey does not, as in most of its other work, occupy a practically exclusive field. It is taking part in a world-wide program, and in this country there are other agencies engaged in similar work.

This Bureau makes observations throughout the continental United States, Alaska, and the insular regions under the jurisdiction of the United States. It operates five widely separated magnetic observatories, from Porto Rico to the Hawaiian Islands. The department of terrestrial magnetism of the Carnegie Institution of Washington is engaged in researches in terrestrial magnetism, confining itself, within the United States, to observations made for special purposes. It is an important user of the data obtained by this Bureau. In the matter of investigations in terrestrial magnetism, the Institution does more, but in such investigations as the Coast and Geodetic Survey is able to make, it cooperates fully and avoids duplication of effort.

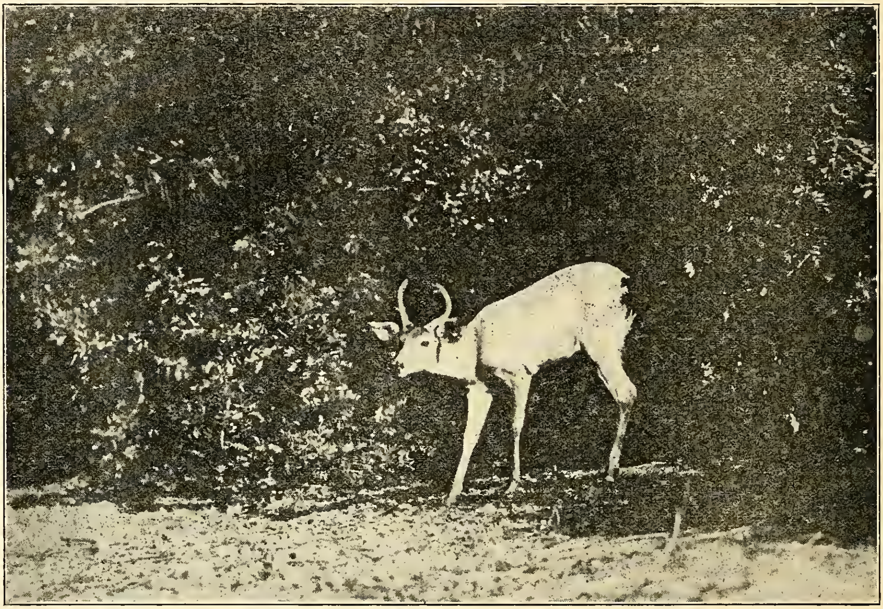
Magnetic observations give the direction and intensity of the earth's magnetic field at the point of observation. The direction is given as declination and dip, declination in a horizontal plane and dip in the vertical. As a result of these observations we have complete and accurate data at thousands of points throughout the United States, including every country seat.

(*Continued on page* 24)

Atchafalaya Deer - - -

By
E. R. GAMMAGE

THE DEER in the picture are some which I was fortunate enough to photograph in their natural environment. They are much larger than those of other species, some of the big male or buck deer weighing as much as two hundred and twenty-five pounds. It is difficult to secure pictures of them, however, for they are naturally very suspicious, and so I had to resort to the Indian's method of being in an open place to attract them. Their moral code seems to be that their enemies are always lurking behind their backs, hiding behind trees, logs, etc., and never daring to face them in the open, where they might have a fair chance. As the trees are very abundant in the Atchafalaya swamp, however, I found it difficult to find an appropriate place for photographing, except near the river, or in the interior of the swamps. I, therefore, chose a position for myself, focused my camera on an open place, waited until the animal came within range, and then pressed the button.



Louisiana Wild Deer in Natural Habitat.

The comparatively few bears which roam the Atchafalaya swamp do not need to give us any serious consideration, as they are as afraid of man as man is of them. A story is told of Pat, the Irishman, which concerns both the bear and the White-tailed deer. Pat went on a bear hunt in Devil's Bend, Eastern Texas, and while perched on a seat waiting for some of his friends to chase the bears out with hounds, to his great astonishment out rushed a big buck deer. A little later, upon being asked if he had seen a bear, Pat replied, "No, but I saw a bloody goat come out with a chair hung on his head." This is about the way the deer with its full-grown horns looks to the new hunter.

The White-tailed deer, which is sometimes called the "Virginia Deer," stands over three feet in height. It is a chestnut color in summer and bluish grey in winter. The antlers are of good size, and measure as much as 27½ inches in length.

The most interesting thing in connection with the deer tribe is the character of its horn growth. The horns belong only to the males and are shed and renewed each year. They are composed of solid bone. In most species, the horns begin to make their appearance in March. They are nothing but prominences on the forehead at first, and are covered with a velvety skin. In a few days' time, however, these knobs have grown several inches, and if one were to take hold of them he would feel that they were very hot. This is due to the fact that the blood courses through them at a very rapid rate, depositing every instant a portion of bony matter, which of course accounts for their phenomenal growth. As the horns grow more and more rapidly, the carotid arteries enlarge in order that a sufficient amount of nourishment may be supplied, and almost sooner than could be believed possible,—a short ten weeks,—the large bony horns have reached their full development. This rapid horn growth has nothing so marvelous to compare with it in the whole animal kingdom. After the horns are fully grown, the bony rings at the bases through which the arteries pass, thicken and fill up the holes, and cut off the blood vessels. Thus, the "velvet" on the horns receives no more nourishment and so it dies and is soon rubbed off against trees and other obstacles. The horns fall off the following February and a new growth is started, varying each year in the number of tines according to the age of the buck.

Deer are found in practically every portion of the world, from the Arctic North where the reindeer makes its home, to Patagonia, in Southern South America. Possibly the only places where they are not found are in Africa, South of the Sahara and in Madagascar and Australia. They were not originally native to New Zealand, but have been very successfully introduced and acclimatized there. The deer are ruminants. They have always been eagerly hunted, as their flesh is good, and their skin is used for a variety of purposes. They were, no doubt, the first animals of the chase, for their bones have been found in the cave homes of prehistoric man, and they are found represented in some of the earliest efforts at drawing. At the present time, there are approximately one hundred species of deer, but many of them very closely resemble each other. The reindeer are different from all other varieties, in that the males and females both have antlers.

The largest specimen of the deer tribe is the elk or moose. It is a forest-loving animal, and is particularly characterized by its vast palmated horns, which sometimes measure six feet from tip to tip. The Red deer, which are found in various parts of the world, are known as the typical deer. They are reddish colored in summer, and greyish brown in winter.

This year seems to be a very poor one for deer in all sections of the United States. While the White-tailed deer in Atchafalaya swamp are in good condition, and show no signs of depletion, because of shortage of forage or water, it is generally understood that the deer of both Kaibab and Grand Canyon are facing starvation.

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Oil Conservation Board Discusses Probable Effect of Shutdown of Wells

Stabilization of Industry Would Result if Suppression Continued Until Sufficient Inroads Were Made on Present Huge Stocks, According to Federal Agencies.

THE shutdown of Oklahoma and Texas oil wells under martial law, recently ordered by the State Governors, would probably stabilize the oil industry if continued until sufficient inroads were made in the country's huge oil stocks, it was stated recently at the Federal Oil Conservation Board.

While the daily average domestic production was 2,461,000 barrels during the first half of the year, the closing down of the wells in the two States has cut this average down to around 1,500,000 barrels daily. Since the domestic demand during the first six months of 1931, averaged 2,435,000 barrels daily, it is apparent that the shutdown is resulting in comparatively large withdrawals of oil from stocks, it was pointed out.

The large stocks have been considered one of the unhealthful conditions of the oil industry, it was explained. Although the oil business bettered its position considerably during 1930, and the first part of this year—the excess of domestic production over domestic demand falling from an average of 76,000 barrels daily in 1930, to 26,000 barrels daily in the first half of 1931—stocks were not being greatly reduced.

At the end of June stocks of all oils totaled 652,620,000 barrels, and crude stocks aggregated 492,768,000 barrels, according to data of the Bureau of Mines of the Department of Commerce.

The following additional information was made available at the Department of Commerce, and the Interior, and the Conservation Board:

EFFORTS TO CURTAIL PRODUCTION OF OIL

The results of efforts to curtail oil production are shown by the decrease in the country's monthly crude output, which fell from about 77,000,000 barrels in June, 1930, to about 67,000,000 barrels in December. The results of failure to curtail the output in the East Texas region is illustrated by the increase to more than 75,000,000 barrels in June, 1931.

For the fifth successive month. June showed an increased output, the daily average being 2,504.000 barrels, 15,000 more than in May. As was the case for a number of months, Texas supplied practically all of the new production, according to Bureau of Mines figures. The total daily average production in that State in June was 982,000 barrels, which was easily the highest daily output ever reached by any State. Nearly all the increased output, moreover, came from the East Texas district, which put out 355,000 barrels daily, as compared with 308,000 in May. Production in Oklahoma showed no great change for the month, while the California output dropped.

It should be pointed out, however, that there was an increased demand for gasoline during the month, and refineries increased their demands for crude, so that both crude stocks and stocks of all oils went down.

There are some interests which maintain that large stocks of oil are necessary for a reserve in case of an emergency, and others that say there is no overproduction in the oil industry. It is generally conceded, on the other hand, that for years the industry has been beset with evils caused by overproduction. The industry first felt the effects of too much output as long ago as 1923, when California became an important producer. In the last five years overproduction has been especially noticeable. The opening of new oil fields and pools, technologic advances, and strenuous competition in the industry, have been regarded as contributing factors to the overproduction.

As a matter of fact, domestic production of oil has exceeded the domestic demand, with the exception of 1920, in every year since 1917. The annual excess passed 100,000,000 barrels for the first time in 1923, and the peak excess was 139,402.000 barrels in 1927. Two years later it was 122.566.000 barrels. The excess in 1930, however, was only 27,755,000 barrels.

SUPPLY AND DEMAND OF OIL CONSIDERED

If imports and exports are taken into consideration, 1930 shows an even more favorable position. The total new supply of all oils was about 1,056,000,000 barrels, and the total demand was 1,080,000,000 barrels. A deficiency of 24,000,000 barrels existed, but it may be said that new supply and demand were practically balanced in 1930, in response to private and public efforts to cut down production.

Administration officials, however, have held that these efforts have been practically nullified by the huge output in East Texas this year, and prices have dropped to unusually low levels.

Some domestic oil producers, viewing the oversupply of oil, and the falling prices, have undertaken a number of measures for restricting production in recent years. The Federal and State governments have also taken an interest in the problem.

The formation of the National Petroleum War Service Committee, during the World War, marked the beginning of co-operation among oil producers. The American Petroleum Institute, now comprising some 90 per cent of the country's petroleum producers, was established after the conflict, and has sought to work out the many problems confronting its members.

When the American oil industry emphasized the waste and inefficiency within it, by boosting production from 770,000,000 barrels in 1926, to 905,000,000 barrels the following year, in the face of general oversupplies in the world, cooperative restriction got under way, and, subsequently, a number of oil fields were made subject to voluntary agreements to hold down the output.

PLANS FOR POOLING INTERESTS DISCUSSED

The unit operation plan for an oil pool, which was first conceived by Henry L. Doherty, head of the Cities Service organization, after scientific investigations revealed its desirability, is now generally accepted in this country, and throughout the world, and appears to be the most favored cooperative method of production. It involves operating an oil pool as a unit, with owners of property in the pool participating in the profits equitably. The Federal Government has placed its stamp of approval on this plan, as it is held to eliminate waste of oil, and natural gas, offers a means of holding down production, and reduces expenses in developing a pool.

Congress has authorized the use of the plan for pools, partly or wholly in the public domain, by an act passed shortly before it adjourned last spring. It has also been authorized in three States.

Nineteen States now have conservation laws, and regulations relating to the production of oil, and gas. Permits to drill, and spacing of new wells, are measures used to control new drilling. Fifteen of the nineteen States control new drilling in some manner. All nineteen have laws governing damage to productive strata. Fifteen States regulate the physical loss of gas, or oil, above ground. Waste utilization is covered in the statutes of fourteen States.

Production in excess of market demands, such as economic waste, waste threatening premature exhaustion, waste incident to overproduction, and waste incident to the creation of excess storage, is regulated in nine States. Eleven States regulate production by provisions dealing with allowable percentages to open flow, gaugings, rock pressure tests, production reports, repressuring operations, and so on. In the laws of nine States are found provisions for production from a common source, by proration and proportional production, and provisions affecting gathering, common purchasers, ratable taking, and so forth. Ratable taking from competing fields is covered in the laws of three States.

California, New Mexico, and Wyoming, are the only States now having laws on unit or cooperative development, or operating agreements.

That there has been progress in limiting production under these laws is apparent, yet conservation, proration and restriction are opposed in a number of States, by some producing companies, and by some independent producers of oil.

IMPORTS OF OIL GIVEN CONSIDERATION

The independents, for example, have said, from time to time, that they can see no justice in curtailing the production of oil while large companies are bringing into the United States, duty free, oil which they had produced in foreign countries. They have claimed that there is likewise no justice in using shut in and potential production as a threat to keep crude at a price below the cost of production. They have opposed regulation of production without regulation of prices.

The independents have maintained that the large oil companies have held that by raising the price of crude oil, there would be inaugurated a wild and unrestricted campaign of drilling, which would increase the output greatly, and ultimately force the prices down again.

The independents have declared that the major producing companies have used potential and shut in production as a threat to keep prices down, and that the companies had three purposes in programs for curtailing production:

To permit the use of potential output as a threat to keep crude cheap; to curtail the output so as to allow them to bring in foreign oil duty free; and to put a high enough price on the imported oil to bring it into competition with domestic.

Independent producers and royalty owners have accordingly been on record as favoring a tariff on oil. The agitation for a tariff has not been confined to the independents, however. The Governors' Oil Relief Conference, which met in Washington January 15, of this year, urged that Congress place a tariff on petroleum. The gathering was called by the Governors of Oklahoma, and Kansas, to devise a plan for relief of the oil industry. A number of members of Congress, other public officials, and private citizens, demanded the duty.

The two Governors, in invitations to Governors of other major oil producing States, to attend the conference, declared that "the present situation has been brought about, in our opinion, by a loss of market for oil produced in the United States, occasioned by ever-increasing imports of crude oil, and refined products, especially gasoline. The imports have been absorbed, in a large measure, by the markets of the eastern States, which formerly were supplied by oil produced in the eastern States, in the mid-continent field, and in California."

EFFORTS TO OBTAIN TARIFF ON IMPORTS

A number of bills were introduced, in both the Senate and House, at the last session of Congress, providing for a duty on crude oil, and its products. One measure progressed to the point of debate on the Senate floor, but it failed to reach a final vote.

The Secretary of the Interior, Ray Lyman Wilbur, as well as other Administration officials, Senators, and Congressmen, have expressed their opposition to an oil tariff. They maintained that as much foreign oil should be usel as possible, and that it should enter duty free, in order that foreign reserves, rather than those of this country, should be depleted.

A voluntary arrangement to curtail imports for three months, in an attempt to help the domestic situation, was reached by American importers of oil, Secretary Wilbur announced, March 30. Royal Dutch Shell agreed to cut its imports by about 50 per cent, the Gulf Oil Company about 25 per cent, and Standard of New Jersey from 60,000 to 45,000 barrels a day. For the latter company alone the agreement meant cutting down imports 5,400,000 barrels during the period of the agreement. Standard of Indiana was also in the pact.

The agreement was renewed upon expiration of the 90-day term, for an undetermined period. Developments in the East Texas fields were expected at that time to govern the companies in deciding whether to continue the curtailing of imports indefinitely, or only temporarily. Three companies had signified their intention of limiting imports at the time continuation of the restriction was announced, July 1, by the Secretary of Commerce, Robert P. Lamont, whereas four companies were in the original arrangement.

OIL VIEWED AS ESSENTIAL TO NATIONAL DEFENSE

The Federal Government could easily avoid considerable criticism by refusing to accept any responsibility for the welfare of the petroleum industry, and declare that the problem rests on the shoulders of the oil producing States. But, as Secretary of the Interior, Wilbur has pointed out, the maintenance of an adequate oil supply and reserve is a vastly important national responsibility, and problem.

The Government is interested in aiding an industry, in which $11,000,000,000 or $12,000,000,000 is invested, to help itself, and in preserving the welfare of the hundreds of thousands of people who are dependent on the oil industry for a livelihood, as well as those who own oil stocks, or royalties. But its interests are not entirely altruistic.

National defense is of paramount importance, and oil is essential to an adequate defense. Fuel oil is needed for fleets, and petroleum, or its products, is needed in airplanes, and varied types of military equipment.

Our Government cannot be indifferent to the condition of its oil industry, in the opinion of Dr. Wilbur, when other nations are exerting every effort to acquire, use, and conserve great petroleum resources. Limited as are the finances of the German Government, it has found money to invest in oil producing property for the protection of national interests.

President Coolidge recognized the national interest of this country when he established the Federal Oil Conservation Board, Dec. 19, 1924. It was composed of the Secretaries of War, Navy, Interior, and Commerce, and the Secretary of the Interior was chosen chairman.

STATEMENT OF MR. COOLIDGE AT APPOINTMENT OF BOARD

At the time he appointed the Board, President Coolidge said: "It is evident that the present methods of capturing our oil deposits is wasteful to an alarming degree, in that it becomes impossible to conserve oil in the ground, under our present leasing and royalty practices, if a neighboring owner or lessee desires to gain possession of his deposits.

"Developing aircrafts indicate that our national defense must be supplemented, if not dominated, by aviation. It is even probable that the supremacy of nations may be determined by the possession of available petroleum and its products.

"I am advised that our current oil supply is kept up only by drilling many thousands of new wells each year, and that the failure to bring in producing wells for a two-year period would slow down the wheels of industry, and bring serious industrial depression. The problem of a future shortage in fuel and lubricating oil, not to mention gasoline, must be avoided, or our manufacturing productivity will be curtailed to an extent not easily calculated.

"We are not today, however, facing an undersupply of oil. The production of our 300,000 wells is in excess of our immediate requirements. That overproduction in itself encourages cheapness, which in turn leads to wastefulness, and disregard of essential values. Oil, of which our resources are limited, is largely taking the place of coal, the supply of which seems to be unlimited, but coal cannot take the place of oil in most of its higher uses, on land or sea, or in the air.

"The oil industry itself might be permitted to determine its own future. That future might be left to the simple working of the law of supply and demand, but for the potent fact that the oil industry's welfare is so intimately linked with the industrial prosperity and safety of the whole people, that Government and business can well join forces to work out this problem of practical conservation."

FINDINGS ANNOUNCED BY CONSERVATION BOARD

In the first report to the President, issued September 6, 1926, the Conservation Board declared that it appeared, at that time, that reserves of oil available by flowing and pumping wells from producing and proven fields amounted to about 4,500,000,000 barrels, which was theoretically but six years' supply. Certain parts of the country are known to be impossible of appreciable oil production, it was pointed out, and they are estimated to aggregate 43 per cent of the total area of the United States. This, the Board said, "does not warrant the assumption that the remaining 1,100,000,000 acres of the country, or any large part of them, will be found oil bearing, and considerable portions of this area have already been drilled for oil or water."

The Board expressed the view that the "major part of the measures that must be taken to protect our future supplies must rest upon the normal commercial initiative of private enterprise. The field for governmental action is considerable, but to formulate the broader by-laws of the industry in the sense of conservation, and to concentrate thought upon them, is the major part of the board's task, in cooperation with the industry."

The directions in which industry can contribute to assured future supplies, according to the Board, are:

Continued exploration for extension of known sands, and deeper sands in known fields.

Continued exploration for new fields.

Systematic research and experiment upon methods of securing a larger proportion of the oil from the sands.

Systematic research and experiment in new methods, and cheapened costs, in refining and cracking oils, and waste elimination.

Cooperative methods in sane development of new fields, to present wasteful flush flow, and overproduction.

Research and application by engine builders of more economical use of petroleum products.

Expansion of American holdings in foreign oil fields.

SUGGESTIONS OFFERED FOR GOVERNMENT ACTION

The following contributions, the Board said, can be made by the Government:

Continued and expanded research by the Geological Survey, in geologic studies of the accumulation of oil and structure of oil-bearing areas; by the Bureau of Mines, into methods of producing and refining, including oil shales; and by the Bureau of Standards, into questions of constitution, and ultilization of oil products.

The more intelligent handling of Government-controlled oil sources on public, and Indian lands.

The Board stressed, as especially important, the cooperative development of new fields, to prevent temporary gluts, as it offered a promising field for action by both industry and the Government.

The power of the Federal Government to regulate oil production is doubtless limited to its own oil lands, unless the national defense is imperiled by waste or exhaustion of the oil supply, according to the Board. State legislation for the protection of all owners in a field would be preferable to Federal action, and the Federal authority "should be invoked only when it is clear that the State is unwilling or fails to act, or when naval reserves are threatened with depletion.

"The right of the State, under its police powers, to prevent the action of one owner from working a deprivation of the rights of other owners of a common property, by one of the owners, seems reasonably clear. If the several oil-producing States should protect property rights in oil produced from a common underground supply, it undoubtedly would have some effect in the direction of stabilizing production, of retarding development whenever economic demand does not warrant, and of making the business of oil production more economical. Such legislation, although not directly regulating production, would, in part, accomplish this, by freeing owners and operators from the present pressure of a competitive struggle."

METHODS ADVOCATED TO CHECK OVERPRODUCTION

The Board has repeatedly advocated the restriction of development of operation through the voluntary agreement of owners, and that appropriate legislation should be enacted to remove the doubt as to the legality of cooperative agreements. Uniform State legislation dealing with oil has been recommended frequently by the Board. And it has urged a Federal-interstate compact as a means of combating overproduction.

The oil industry has expressed its opposition to any direct government interference in its workings, but it has favored amending the anti-trust laws sufficiently to permit cooperation in the industry, in the interests of conservation and limitation of production, to a reasonable amount. It should be pointed out, however, that all elements in the industry have not been in accord with this view.

President E. W. Clark, of the American Petroleum Institute, in naming, at the request of the Secretary of the Interior, three members of a committee of nine to discuss legislation that might aid the oil industry, declared that he could not undertake to pass upon, still less accede to, any suggestion that the Federal Government may directly regulate the production of crude oil in the several States, or that it should attempt to do so.

This committee, made up of three representatives of the Institute, three of the American Bar Association, and three of the Government, issued a report, made public by the Conservation Board February 5, 1928, in which it favored amending the anti-trust laws, but opposed altering the law on oil production.

"In our judgment, the only practical law governing the right to recover oil is that which now exists, and which has been developed to meet the necessities of the case," it was pointed out in the report.

The committee recommended: Federal legislation which shall unequivocally declare that agreements for the cooperative development, and operation of single pools are not in violation of the Federal anti-trust laws, and permit, under suitable safeguards, the making in times of overproduction of agreements between oil producers for the curtailment of production. Similar legislation by the various oil-producing States. Immediate further study into the matter of the waste of natural gas, in order that legislation may be formulated which will forbid such waste, as fully as may be done, without injustice and unreasonable hardship. Legislation by Congress, granting the Secretary of the Interior authority to join in agreements for the cooperative development, and operation of single pools. The passage by Congress of the legislation recommended to it by the Secretary of the Interior, removing the existing mandate upon him to offer for lease annually, regardless of conditions, 100,000 acres of Osage Indian lands.

Eight days after President Hoover took office, he issued an executive order committing his administration to an oil conservation policy. It said, "There will be no leases or disposal of Government oil lands, no matter in what category they may lie, of Government holdings of Government controls, except those made mandatory by Congress. In other words, there will be complete conservation of Government oil in this Administration."

During the last two years, the policy has resulted in a denial of all applications for prospecting permits, except those based on prior equities, and slowing down as much as possible drilling on public land.

In a second report to the President, January 16, 1928, the Conservation Board declared that the cooperation asked of the oil industry by the Federal Oil Conservation Board has now become an active working force in the betterment of conditions. Yet, in a third report, on February 25, 1929, the Board informed the President that "the excess production commented upon by you when you created the Board in December, 1924, unfortunately continues. The flow from new wells has more than offset the declining output of old wells; production has even kept ahead of increasing consumption."

NEW APPRECIATION OF RESPONSIBILITY SEEN

The Board added in this third report that the complete organization of cooperative effort recommended in its first report had not been attained, but the keen and sustained attention given to the study of new methods, the many conferences held, the large number of working committees organized within the industry, and the cooperative spirit with which different units have worked together, are all indicative of a new appreciation of responsibility.

"The acceptance of the principle of conservation as a practical policy, by the foremost executives of the larger oil companies, is a hopeful sign of the times. The closer contacts, both within the industry and between it and State and Federal officials, also promise gradual betterment of economic conditions. In short, more progress has been made than was expected."

Pointing in this report to the fact that the United States "is producing and consuming twice as much petroleum as the rest of the world," the Board said that neither the high rate of domestic consumption, nor the excess of exports over imports, would be disquieting, if the petroleum resources of the United States bore anything like the same ratio to the world's resources as the production ratio of 68 per cent. Our total resources, it said, were only 18 per cent of the world's total. The obvious inference, it was stated, "is that the United States is exhausting its petroleum reserves at a dangerous rate."

In addition to unit operation of oil pools, and uniform State legislation on oil, the Conservation Board has strongly urged an interstate compact as a solution of the petroleum problem. Such a compact was also suggested at an oil conference, July 10, at Colorado Springs, Colo., attended by Federal and State officials, and representatives of the industry. The Oil States Advisory Committee, appointed by the Governors of ten States to consider "the present dire condition of chaos and distress existing in the oil industry, and to make recommendations for the betterment of such conditions," requested a conference with the Conservation Board last April 9, and also urged a compact.

EFFORTS TO COORDINATE CONSERVATION PLANS

The members of the committee presented a program calling for coordinating State conservation effort, through an interstate compact, which would reserve to each State the regulation of production within its own borders by its own enforcing agency, but would coordinate their action through the ten oil States by some conference group. These ten States produce more than 97 per cent of the Nation's oil.

Any arrangement the States may work out must be submitted to Congress for approval, and it is likely the agreement would call for some measure of Federal cooperation, to guard against the possibility of unreasonable oil prices.

Addressing the Governors Oil Relief Conference in Washington, January 16, Secretary Wilbur stressed the need of an interstate compact, saying that he saw no other substantial, lasting remedy for the ailments of the oil industry. The conference, called by the Governors of Oklahoma and Kansas, when a crisis arose following the withdrawal of a large pipeline company from the market, the first of the year, did not express itself on a compact. Rather, it urged a tariff on oil as the means of stabilizing the industry.

In a resolution adopted January 15, the conference declared that, "at the present, and except for one year (1923) in the last fifteen years, there has been no domestic overproduction, due to intelligent proration, sacrificially made, but an oversupply oil created by imports."

Later the conference sent a petition to Congress stating that "we, the representatives of the petroleum industry, the business interests, and the farmers, and laborers of the oil-producing States, duly appointed and accredited by the Governors thereof, in convention assembled in Washington, D. C., this January 15, 1931, do hereby solemnly petition and urge the Congress of the United States to enact, without delay, a law placing an adequate tariff upon imports of crude petroleum, and its refined products, or in the alternative, we pray that the Congress enact, without delay, a law limiting the importation of crude petroleum to 20 per cent of the amount imported during the calendar year 1928, and that in the interest of American labor the law absolutely prohibit the importation of any of the refined products of petroleum, said imports to be allowed only from those countries from which petroleum was received during 1928."

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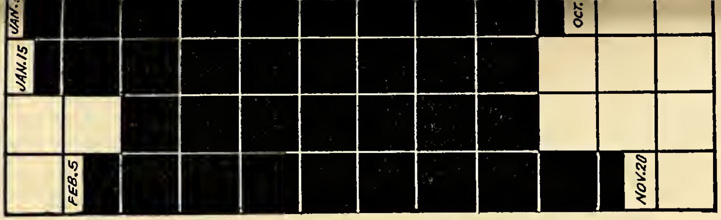
Louisiana Fur, Game, and Fish Laws, 1931-1932

■ BLACK SQUARES DENOTE CLOSE SEASONS ☐ WHITE SQUARES DENOTE OPEN SEASONS
NUMBERS IN SQUARES ARE OPEN DATES

MIGRATORY GAME BIRDS	JAN.	FEB	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP	OCT.	NOV.	DEC.	BAG AND POSSESSION LIMITS
WILD DUCKS Except Wood Duck	■	■	■	■	■	■	■	■	■	■	NOV.16	DEC.15	15. daily, 30 in possession at one time.
WILD GEESE	■	■	■	■	■	■	■	■	■	■	NOV.16	DEC.15	4 daily, 8 in possession at one time.
COOT (POULE D'EAU)	■	■	■	■	■	■	■	■	■	■	NOV.16	DEC.15	25 daily, 300 season.
SNIPE	JAN.15	■	■	■	■	■	■	■	■	■	□	□	20 daily, 240 season.
DOVE*	□	■	■	■	■	■	■	■	■	■	■	□	25 daily, 300 season.
WOODCOCK	■	■	■	■	■	■	■	■	■	■	■	□	4 daily, 22 season.
RAILS	JAN.15	■	■	■	■	■	■	■	■	■	□	□	25 daily, 300 season
GALLINULES	JAN.15	■	■	■	■	■	■	■	■	■	□	□	15 daily, 300 season.
SORA	JAN.15	■	■	■	■	■	■	■	■	■	□	□	25 daily, 300 season.
RESIDENT GAME BIRDS													
BOB WHITE (Quail or Partridge)	□	FEB.15	■	■	■	■	■	■	■	■	■	□	15 daily, 120 season.
WILD TURKEY	■	■	MAR.5	APR.5	■	■	■	■	■	■	■	■	1 daily, 5 season.
GAME ANIMALS													
DEER* Northern Zone	JAN.15	■	■	■	■	■	■	■	■	■	■	□	1 daily, 5 season.
DEER*	[illegible]	■	■	■	■	■	■	■	■	■	□	□	1 daily, 5 season



BEAR	1 daily, 5 season.
SQUIRRELS	10 daily, 120 season.
RABBITS	No limit, may be sold in open season.
FUR ANIMALS Muskrat, Mink, Opossum, Otter, Raccoon, Wolf, Fox, Skunk, Etc.	Trap limit 250, traps must be visited daily.

*DEER ZONES.—Northern: Concordia, Avoyelles, Rapides and Vernon and All Parishes North.
Southern: All parishes south.

HUNTER'S LICENSE PROVISIONS

LICENSE YEAR JULY 1 TO JUNE 30

HUNTING LICENSES:

Residents, all game birds and animals . . . . $ 1.00
Non-residents, migratory game birds only $25.00
Non-residents, game birds and animals $50.00

TRAPPING LICENSE:

Residents only, does not allow hunting, good only in parish where trapping is done $2.00

FISHING LAWS

FRESH WATER GAME FISH

KINDS	Size Limits	Creel Limits
BLACK BASS (green trout)	10 inches or more	20 daily
YELLOW BASS (striped bass)	7 inches or more	25 daily
WHITE BASS (barfish)	7 inches or more	25 daily
CRAPPIE, (White perch, speckled perch, sac-a-lait)	7 inches or more	25 daily
SUNFISH (perch, bream, goggle-eye, blue-gill, etc.)	5 inches or more	100 daily

CLOSE SEASONS AND CLOSE ZONES

No state-wide close seasons on game or commercial fish. Department of Conservation can authorize close seasons or close zones in any waters where necessary, otherwise fish can be taken at any time or place provided size limits and other restrictions are observed.

ANGLER'S LICENSE PROVISIONS

LICENSE YEAR JANUARY 1 TO DECEMBER 31

Resident, per annum . . . . $ 1.00

Required of all anglers fishing for fresh and salt water game fish with rod and reel, artificial baits, spinners, or live natural baits. No license required when using dead natural bait or worms, grubs, clams, and mussels on ordinary pole and line.

Non-resident, per annum . . . . $ 5.00
Tourists or transients limited to 7 consecutive days 1.00

Required of all non-resident anglers fishing for fresh and salt water game fish, irrespective of tackle or bait used.

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TELEPHONES MAIN 1914-1915-1916

°NOTICE—Federal Bag Limit of 15 ducks and 4 geese daily must be observed.

* Dove Season in Louisiana: December 1st through January 31st must be observed as only open season.

Louisiana Nature Guardians

"Upon my honor, as a Louisiana Nature Guardian, I promise to take care of all our natural friends, to guard and protect them to the best of my ability, and as far as possible influence others to do the same."

WHEN the Nature Guardian Club of Louisiana was formed several years ago, it met an instant and hearty response from the teachers and the school children all over the State. From a small interested group it has grown steadily into a mighty force of thousands of young conservationists. These children are the proud possessors of handsome lithographed badges, and certificates of membership. New clubs are being formed each week and it is the purpose of the Educational Bureau to enroll every Louisiana boy and girl, white or colored, under the Nature Guardian banner.

HOW YOU CAN BECOME A NATURE GUARDIAN

YOUR PART

Consult your teacher.

Ask that the purpose and plans of the Nature Guardian Club be explained to you and the class.

Ask for an application card.

Get a responsible person to indorse it, after proving that you fully understand the duties of a Nature Guardian.

Sign the application and mail the card, or give it to your teacher, to send, postage prepaid, with cards from all the class.

OUR PART

We send the application card.

We send you a handsome badge, a certificate of membership, Nature Guardian pamphlets and other literature.

This is all free, and is carried on with the purpose of instilling into the children's minds a knowledge of Louisiana's wild life and a thorough understanding of its economic value to the State.

It also aims to develop individual humanitarianism. Even within this short time an amazing improvement has been made in the mental attitude of our young folks toward the conservation and protection of Louisiana's natural resources.

EDITORIAL

MY DEAR GUARDIANS:

"The marking of birds with a small piece of metal, on which there is stamped a number and an address, has become generally recognized by naturalists as a valuable means for determining much of the life history of these interesting and valuable denizens of our forests, fields, waters, and marshes," says E. A. McIlhenny in a recent article on bird banding.

The purpose of banding is to learn how long birds live, what routes they travel in migration, how many miles they travel in a day, whether or not they return to the same locality, whether or not they keep the same mates, and many other interesting things about bird life.

In 1920, The American Bird Banding Association was taken over by the U. S. Bureau of Biological Survey and, since that time, the work has been carried on with great activity, and much useful and interesting information pertaining to our birds has been gathered. Some of the birds that Mr. McIlhenny has banded are 885 Lesser Scaups, and 453 Pintail. A Green Wing Teal, banded in 1922 at Avery Island, was taken in Cohuilla, Mexico, in 1930; a Lesser Scaup, banded in 1916, was taken in Ft. Smith, Canada, in 1919; a pintail, banded in 1917, was taken at Portland, Oregon, in 1925.

If one of you Guardians handle any game bird or find any other kind of bird, dead or alive, examine its legs for a band, and read the number very carefully. If the bird is alive, leave the band on it and release it, but make a written report to the Bureau of Biological Survey, Washington, D. C., or to the State Department of Conservation, New Orleans, La.

If the bird is dead, remove the band, being careful not to lose it, and send it, together with date of finding, name of place, etc., to the Bureau of Biological Survey, or to the State Department of Conservation of Louisiana, New Orleans.

It seems to me that the Guardians should be very much interested in bird banding, and would all enjoy reading the article by Mr. McIlhenny in the Louisiana Conservation Review of December, 1930. Guardians should be alert to all conservation matters, and bird banding is certainly a valuable link in the conservation chain.

With love and best wishes for a happy and prosperous New Year to all Guardians,

Cordially yours,

THE EDITOR.

"Only a man in a forest green,
Only a match that was dropped unseen,
Only a flash—some leaves and wood,
And only a waste where the forest stood."

Slidell, La.
Oct. 26, 1931.

DEAR EDITOR: I am a girl fourteen years of age, in the eighth grade. I, and also my classmates are very much interested in your Guardian Club. I have thirty classmates. We should like to become members of the Club. Please send us the cards and other things that we shall need to join.

We would also like to receive Nature Guardian phamplets and other literature. Hoping to hear from you in a short while.

Yours affectionately,

Rosetta Simon.

We have sent Rosetta her application cards, and welcome her and her friends to our band.

Here is a little poem by Sylvia Molla, clipped from the New Orleans *Item-Tribune.*

THE LITTLE BIRD

BY SYLVIA MOLLA

There was once a little bird,
Who hopped up in a tree.
He sang a very beautiful song,
And then he looked at me.

He hopped upon my window sill.
I said, "Little bird, how do,"
But he didn't pay any attention to me,
He shook his feathers and away he flew.

His feathers were black and red,
His bill was very yellow.
He flew into the woods.
He is a brave young fellow.

I wonder what bird it was! Do any of the Guardians know?

SONG OF WINTER

The Frost King sings, when he comes to earth,
A quieting melody,
Like a mother putting her babe to rest,
And he croons it tenderly.

Beguiling earth into dreams of spring,
Of youth that was ever so fair,
Till she decks herself in her gayest gown,
With scarlet leaves in her hair.

And the Frost King smiles; it will not be long—
She will lay all these aside—
He will shower on her the fairest gowns,
Dressing her as a bride.

THE OAK LEAF'S STORY

My mother was a large oak tree, the kind that keeps its leaves all winter. At first I was a small bud, under the stem of a large leaf. This leaf clung to the twig, which was our home through winter's snow and ice, and I did not get much chance to grow.

But one April day, a warm rain fell, and I felt myself swelling. And what do you think? What snow and ice could not do the power of growth, which is the strongest force in the world, did, I grew stronger, until one day I pushed the large leaf off the twig, and it fluttered down to our mother's feet.

Then I burst out and was soon a full grown leaf. Through the happy summer days I danced on my swaying twig. Down below the butterflies hovered over the flower beds, and around me the birds sang in our branches. At night a low wind gently rocked me to sleep.

But soon the autumn frosts came, and new beauty came to our neighbor trees. The black ash was violet and bronze, the oaks crimson, the sugar maples gold, and our own leaves were spotted with red.

"Aren't we pretty?" I boasted to a fellow leaf.

"We are now," it answered. "But all this glory cannot last. The first hard freeze will turn us brown." That is just what did happen.

I spent the winter as the leaf before me had done, and in the spring was pushed off the twig, just as that leaf had been. I floated some distance away, and lodged at the foot of a rosebush.

The next day a little girl, with a very large spade, came and dug me down close to the roots of the rosebush. I am turning into leaf mold, and am nestling close to a root. Next spring I shall climb up the root and help .to build a stem, and in June I shall dance at its top—a lovely pink rose.

THE MINK

An ordinary mink is about the size of a house cat. Its home is in the forest. Minks eat for their food, nuts, berries, insects, and other smaller animals. The mink's color is usually brown. Its fur is smooth and shiny. Mink fur is very pretty on a coat. A mink is very swift and usually caught in traps. To catch one, the trapper must put his trap near water, and cover it with green moss or with leaves. Some are caught in logs, also. The skin is very stiff after dried. Often the mink fur is dyed and sold as other kinds of furs. The mink is one of the animals that has the prettiest fur.

LUCY MAE TROSCLAIR,

Lutcher, La.

Lucy Mae's story of the mink is quite interesting; we can add that Louisiana has more minks than any other state. During the 1929-30 season, the mink catch for Louisiana was 69,680, valued at many thousands of dollars. In a recent issue of the "Saturday Evening Post" was the following very clever verse:

"The mink is seen to gloat.
His smile is comprehensive,
Because his furry coat
Is frightfully expensive."

Here are some new members who have taken the oath of allegiance:

Leo Verret,
White Castle, La.

Harold Barrios,
Gramercy, La.

Florence Barrios,
Gramercy, La.

Floyd Michel,
Gramercy, La.

Frank Terrell,
Baton Rouge, La.

Susie Kemp,
Independence, La.

Dolores H. Kemp,
Independence, La.

Rene Baus, Jr.,
Gramercy, La.

Cleta Savoie,
Gramercy, La.

Rhea Dugas,
Norco, La.

Harry Allen,
Donaldsonville, La.

Leon Bass,
Elizabeth, La.

Alice Lefort,
Golden Meadow, La.

Aline Helen Gruhler,
Gretna, La.

Lawrence Duplantis,
Houma, La.

We shall be glad to hear from our members at any time, and shall be glad to print their poems, themes, and letters about any of the natural resources of Louisiana. We hope that our next issue will contain many interesting articles by members of our Club.

Address all letters to: NATURE GUARDIAN EDITOR, DEPARTMENT OF CONSERVATION, New Court Building, New Orleans, La.

RISE AND FALL OF TIDES RECORDED BY SCIENTISTS

(*Continued from page* 11)

A continuous photographic record is made at the observatories, by instruments with various sensitive magnets, whose motions are recorded photographically, observations similar to those made in field observations, but more accurate, and serving to transform the variations measured photographically to actual values. In addition to many other uses, these observatory results make it possible to reduce all values to standards, a very necessary detail, since the direction of the magnetic needle is continually changing through small amounts.

This information, complete and adequate to meet almost any type of inquiry, is published in the form of maps at five-year intervals, and in various publications. It is, of course, used first for which it was originally undertaken — the placing of accurate information on the mariners' charts, and now on the aviators' maps.

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Control of Predatory Animals in California

Director of Activity Shows How Efforts of State and Federal Government Have Aided Poultry and Livestock Industries

BY CHARLES G. POOLE
In Charge of Predatory Animal Control, State of California

THE control of predatory animals, along intensive systematic lines has been carried on in California for ten years, under cooperative agreement between the United States Department of Agriculture, Bureau of Biological Survey, and the Department of Agriculture of the State of California.

The Chief of the Division of Plant Quarantine and Pest Control of the last-named agency has been the medium of direct contact, being responsible for the State's interests in the matter of funds, and efficient, and satisfactory administration.

The cooperative agreement provided that the Biological Survey would assume the direct leadership of field operations, and the direction of hunters and trappers employed in control work. This system has been carried out, with the leader of predatory animal control submitting reports of all activities to the State Department of Agriculture, as well as to the United States Bureau of Biological Survey. The closest cooperation has been maintained throughout the 10-year period, with great harmony existing at all times.

Starting on a small scale, the work was confined to three or four counties during the first year. These counties included Nevada, Humbolt, Siskiyou and San Bernardino. A few small demonstrations were held to establish cooperation with those countries in need of predatory animal control work.

Considerable opposition was experienced for some time, to the new order of things, since the system was unknown and untried in the State, and, as is often the case, any divergence from a stereotyped procedure is looked upon with suspicion.

It was quite generally the belief that this new system was an impracticable one, and that the things claimed for it could not be done. This stand was primarily based upon the fact that the older order of things proved to be without avail, and stockmen were thoroughly discouraged, and and felt certain that they were whipped, and could conceive of nothing that would be more effective than the antiquated methods which they had used for years.

Coyotes had taken the ranges, and in many localities had driven small stock owners out of business. The large owners had come to the point where they accepted their annual loss from marauding predators as a part of the liabilities of the business.

These losses mounted higher, as time went on, and it was stated that, in many instances, the loss among sheep ran as high as 20 per cent. Large areas of potentially valuable grazing land were rendered untenable, because of the predatory animal population.

This condition worked a severe economic hardship, not only upon the landowners, but upon the counties, and even the state, through loss of taxes, etc. Livestock was not the only thing to suffer from the activities of predatory animals. Game animals and birds were being depleted in numbers, on a great many areas, and to a lesser extent certain fruit crops suffered materially, especially from coyote depredations.

The results of systematic work, and the use of modern methods, demonstrated to the counties that a job which seemed to them impossible of accomplishment was entirely feasible and practicable. It was not long before the results obtained in pioneering counties were well advertised over the State.

The result was, that today practically all counties where stock and poultry raising are major industries, are cooperating, and these industries are once more in a satisfactory condition so far as this particular matter is concerned.

In some counties there has been an increase in sheep population of from 100 to 200 per cent. In securing these results the policy has been and will continue to be one of control only, and not totally to eradicate all predators. It is possible to reduce them so that they will constitute only a very small liability to the economic welfare of the State. To eradicate entirely any species of wild life, with possibly one or two exceptions, is unthinkable, and does not enter into our plans, as nearly all of these predators have some redeeming characteristics.

Vast areas of the State are well populated with various species of carnivorous animals, which may be considered potential menaces, but because of environment and general economic conditions, are usually harmless to livestock, and only follow out a well-defined law of nature in their activities among game, which tends to keep all species reduced to normal. Such areas are undisturbed by the control forces.

The estimated losses in the aggregate from predatory animals now are less than 1 per cent, as against 10 to 20 per cent average loss 10 years ago. It is difficult even to approximate these percentages at times, since there seems to be a tendency to overestimate losses.

In addition to the large reductions in mortality among sheep, an important point to be considered is the very material reduction in overhead expenses, due to the stock being turned loose upon the ranges, without one or more men to guard them from marauding predators. Other factors of similar character enter into the conclusion as to the results.

At the beginning of this 10-year period, the antelope, and mule deer herds, in the north and northwestern parts of the State, were being preyed upon to an alarming extent by coyotes, the antelope in particular being rapidly exterminated. The so-called Mt. Dome herd numbered less than 90 animals in 1920, while a conservative estimate is at the present time in excess of 400.

This increase is due primarily to reduction in number of the coyote population, and the continual follow-up program which is necessary to the permanent welfare of the antelope, especially in a snowy country. This applies also to the mule deer in Siskiyou, Modoc, and Lassen Counties, where these two species of animals are most in evidence.

During the period involved, 39,835 predatory animals have been officially accounted for by the Federal, State, and county hunters and trappers. By "officially accounted for" is meant those animals that have been reported as killed by the methods employed and these reports verified by skins and scalps turned into headquarters.

Bear are molested only when, after careful investigation, it is determined they are directly responsible for considerable losses among livestock. Bear are considered primarily a game animal. In cases where foxes have been responsible for serious depredations on livestock and poultry, they have been placed in the same category as the coyote and dealt with accordingly. However, they are molested as little as possible, and all precautions used to prevent catching them, unless there is good reason. This policy holds true in regard to all fur bearers.

In spite of the fact that more or less control of predatory animals has been attained, during the 10 years past, there must be a constant campaign kept up in order to maintain the advantage secured. The prime reason for this is the unusual characteristics of the coyote, which is one of the versatile wild animals in this country, and is able to adjust himself to any and all conditions. Also, the fecundity of the coyote is great, which is of material advantage, in the face of adversity. This with natural cunning and perseverance, make this animal a factor to be reckoned with for years to come.

FISHERIES OF LOUISIANA

(*Continued from page* 8)

There are 3 cold storage warehouses operated in Louisiana, which make a practice of storing frozen fishery products. These are capable of holding 1,140,000 pounds of frozen fish. They are also equipped to freeze 108,000 pounds of fishery products during a working day.

The manufacture of fishery products and byproducts in Louisiana in 1929 was conducted by 66 proprietors, and employed 51 salaried employees and 1,548 wage earners, who received $680,510 in salaries and wages.

SPORT FISHING

Sport fishing is one of the most popular recreations in Louisiana, and is indulged in by about 38,000 licensed anglers, and undoubtedly by many more thousands of minors, and others who are not licensed. Most of the lakes and ponds, rivers, and streams, and many of the salt-water areas provide excellent sport fishing, especially for the capture of warm-water species of fish. The State is continually stocking its interior waters with such game fishes as the black bass, and sunfish.

In 1930 the Department of Conservation operated one hatchery which had an output of 710,000 fry, of the above species. In 1931 two hatcheries were operated by the State, and two more were being constructed. In addition, the Federal Bureau of Fisheries is constructing a hatchery at Natchitoches for the propagation of warm-water species, such as black bass, and sunfish. During the past year the bureau distributed a quantity of fish in the State which were reared in hatcheries in other states.

Forestry's Relation to Public Welfare

Large Areas Still Need Protection From Fires.

By MAJ. R. Y. STUART

Chief Forester, Forest Service, Department of Agriculture.

THE existence and condition of our forests is of interest to every citizen, because upon them he is dependent for many necessities, and benefits. They are a source of supply for wood, which he uses in a multitude of forms; they furnish protection to water sheds, from which he derives water for domestic and other uses; they hold the soil, and thus prevent devastating erosion and silting; within them are harbored much of our game and fish life; they are an unfailing source of enjoyment, inspiration, and recreation to our people. Without forests our social and economic condition would be pitiable.

Of outstanding importance in forestry is the protection of forests from fire. It is obvious that we can not have forests unless they are assured protection from fire, disease, and other enemies. Important as this requirement is, forest fires continue throughout the United States in increasing numbers. Ninety per cent of them are traceable to human carelessness. Unfortunately, the increased travel into forest areas is occasioning an increased hazard. Such fires are caused by careless use of camp fires, by brush burning at inappropriate times, by lighted cigarettes and other tobacco, by fire from locomotives and other machinery, and from other sources and agencies failing to take necessary precautions against the use of fire in the woods.

To overcome human failures in safeguarding the forests against fire, the most effective method is education. Whether the responsible individual is indifferent or careless, he is in the great majority of cases interested in retaining our forests, and is attracted to them by the benefits they afford. He has failed, however, to appreciate wherein he and others lose by this needless forest destruction.

One of the most effective agencies set up to deal with the individual in matters of fire prevention is the American Forestry Association, which is now commemorating its 50th anniversary in Asheville. For the past several years, the Association has been conducting an intensive campaign throughout several of the southern States, to arouse the interest of the individual in forest protection, and thus give greater security to the forests. This highly commendable work has been done by talks, motion pictures, lantern slides, exhibits, and other methods of demonstration.

Practically all of the States having appreciable areas of forest land maintain an organization for forest protection. These organizations are comprised of experienced men in fire prevention, and suppression, but they must necessarily depend upon the co-operation and support they obtain from local citizens. The State organizations co-operate with the owners of forest land, and with the Federal Government, which also is actively interested in this field. Under the so-called Clarke-McNary Act, the Forest Service co-operates with the State forest service, and with private owners of forest land, in fire prevention and suppression. There is, therefore, a concerted drive on the part of public agencies, and co-operating private agencies, to curb the destruction done by forest fires.

There are many ways in which the individual citizen can be of assistance in forest protection. His greatest assistance can be in exercising care with fire in the woods, and using his influence to have others careful also. He can promptly report to the nearest forest fire warden any fire that he may see, or learn of. He can directly assist, whenever his services are needed, in the suppression of fire. He can support the public and private agencies in their efforts to obtain facilities and personnel with which to provide adequate protection for the forest.

Sixty-four per cent of the forest land in the United States in need of protection has no systematic protection from fire, and much that is covered by protection systems is inadequately protected, for lack of facilities or personnel.

The protection of our forests is of more than general interest. Forest values and benefits directly affect the individual, because every one of us is dependent, in many ways, on the forest and its products. It is to the individual we must look, through the safeguards he takes, and the active support he gives, if the terrific hazards and stupendous losses occasioned by forest fires are to be curtailed.

Essential as forest protection is, it is not the end in forestry, but merely the beginning. To yield their highest returns and greatest public values, forests must be managed with understanding, and skill. If we are to have continuing supplies of forest products, security to our water-

(*Continued on page 40*)

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Oysters Declared Year-around Food

THE belief that oysters should be eaten only during the "R" months is a widespread fallacy, according to J. M. Lemon, associate technologist in the Commerce Department's Bureau of Fisheries, who has just completed a study of the market for fresh oysters in fourteen cities of the United States.

Information was obtained by personally interviewing 127 dealers, and 1,393 housewives, in Washington, Baltimore, Denver, Oklahoma City, Kansas City, Des Moines, St. Paul, St. Louis, Chicago, Buffalo, Columbus, Chattanooga, Birmingham, and Atlanta.

As a possible reason for the growth of the popular fallacy that oysters are not good in the summer, Mr. Lemon pointed out that eighty or 100 years ago methods of transportation and handling were not advanced to the modern level, and that as a consequence oysters were more liable to spoilation.

Mr. Lemon contrasted those times with the present in the matter of freezing oysters and the effects this process has upon distribution. Oystermen freeze the oysters about April and hold them until the summer arrives, when they are released on the market. Great improvements are now being made in the freezing of oysters, he pointed out.

Oysters are found in every seacoast State in the country, Mr. Lemon said, and a commercial fishery for them is conducted in all these States except Maine and New Hampshire. According to recent figures the production of oyster meats now amount to about 156,000,000 pounds annually, valued at approximately $17,000,000 to the commercial oystermen.

A considerable portion of this is taken from privately owned oyster beds upon which oysters are farmed; that is, oysters are planted and harvested in a manner comparable to the planting and harvesting of crops on land. During the past few years the proportion of each season's catch of oysters taken from private beds has increased; and as time goes on it is expected that the bulk of the catch may be taken from farmed beds.

Louisiana Tree Seedlings

The Department of Conservation, through its Division of Forestry, announces that its fall and winter delivery of tree seedlings is ready.

All seedlings are packed and shipped F. O. B. Woodworth, La. It is requested that orders for these seedlings be sent in at once, so that arrangements can be made to ship these trees during the cool weather and proper planting time.

Herewith is a list of the seedlings and their prices.

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Live Oak	*Quercus virginiana*	40,000	......
Red River Oak	*Quercus nuttallii*	70,000	10,000
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White Elm	*Ulmus americana*	1,000	......
Winged Elm	*Ubmus alata*	1,000	200
Catalpa	*Catalpa speciosa*	15,000	1,500
Cypress	*Taxodium distichum*	5,000	1,000
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Hackberry	*Celtis laevigata*	250	......
Red Maple	*Acer rubrum*	3,000	200
Sweet Gum	*Liquidamber styraciflua*	250	300
Sycamore	*Platanus occidentalis*	1,000	......
White Ash	*Fraxinus americana*	40,000	1,600
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Miscellaneous	Exotics, etc.		

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All seedlings are sold for purposes of rehabilitating cut-over lands, and under no conditions are seedlings sold for ornamental or re-sale purposes.

Louisiana schools, 4-H Clubs, etc., will be furnished with seedlings free, except for transportation charges on large orders.

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California Tree Named for Three Founders of Save-the-Redwoods League

(Reprinted by courtesy of "American Forests")

THE WORLD'S TALLEST TREE, a giant redwood 364 feet in height, standing in North Dyerville Flat, near Dyerville, Humboldt County, California, has been dedicated to the three founders of the Save-the-Redwoods League—Dr. John C. Merriam, of Washington, D. C., president of the Carnegie Institution of Washington, and president of the League; Dr. Henry Fairfield Osborn, of New York, president of the American Museum of Natural History; and Madison Grant, of New York. The dedication was part of the ceremony officially dedicating the newly acquired 10,000-acre Bull Creek-Dyerville Redwood Forest as a part of the California State Park System.

A hand-engrossed copy of a laudatory resolution passed by the California State Park Commission was presented to Dr. Merriam, who represented the founders of the League, by Mrs. Edmund N. Brown, a member of that body.

During the morning ceremonies, dedicating the new park unit, Dr. Merriam said:

"This grove is a thing of world interest. There are other forests with tree-trunks larger in diameter or with greater bulk. There are none in which the trees are taller or more graceful or which show so well these qualities combined with mass. There are none in which the setting illustrates such striking beauty of the trees and associated vegetation, combined with the elements of magnitude and antiquity.

"The work of preservation is a result of effort by many individuals and organizations of this state and of the nation. There has never been a movement with greater appeal and finer support than that directed toward saving of the redwoods. The program included a wide variety of elements, ranging from uses which concern economic value up to the highest aesthetic and artistic aspects of appreciation.

"Although purely recreational value, in the sense of exercise and out-door life, has had an important part in the movement to save these areas, this has always been subordinate to the idea that the redwoods are objects of exceptional beauty and primitive grandeur. It is the uses which satisfy the spirit of man rather than those which concern solely health of his body that have been dominant.

"The elusive element of natural beauty is that phase in the redwood program which to many seems of greatest importance. There is, however, another aspect which is universally a determining influence in the effort to save these groves; this is their primitive character. The fact that this is an unmodified result of creative activity, expressing development of life in one of its most splendid forms, has had great significance in work leading to preservation of the Bull Creek-Dyerville Forest.

"Beauty of nature is attractive, whether its development be guided artificially or is the direct result of growth without human influence. But the reaching upward of creative power and beauty out of a remote past gives to this forest the crowning influence of an otherwise magnificent natural spectacle. Our preservation of these groves we recognize as not merely the saving of a natural feature such as only centuries upon centuries could produce. We see it as a continuation of one of the most splendid aspects of creation in the world of living things.

"The broader world movement to protect for recreational and inspirational use the finest examples of nature has come to have a place of real importance. City parks, framed as it were under our hands, furnish a growing joy to numberless lives for which otherwise the meaning of nature might almost vanish. In the more closely populated areas of America, and over a large portion of the great countries of Europe, such work means re-establishing of natural conditions. But the wholly primitive, representing unmodified results of Nature's work, comes nearer and nearer to extinction. Our own country furnishes some of the remaining opportunities for maintenance of the primitive as an element of significance to future generations. Preservation of the Bull Creek-Dyerville Forest is one of the outstanding examples of something superlative in the world of living things which may not only be preserved in its naturalness but can be protected in its primitiveness as the unquestioned continuing influence of the developing world as it was before man came into being. One of the grandest works among things which live, this forest seems like a fragment of the Garden of Eden coming to us directly from the hand of the Creator.

"But it is better that I speak of the future than of the past. Dedication concerns that which is to come. Credit to those who have already accomplished will be measured out through the coming years. At the moment the most critical question concerns the use to which this forest, or picture, or cathedral, or sermon in trees will be put. Shall we follow the idea which inevitably suggests itself, and open every recess of the sanctuary to continuous and unrestrained use by the multitude? Shall we promote unlimited use of the entire area? Shall we give intimacy of acquaintance by erecting hotels and resorts in the midst of the grove? Shall we build spiral ladders around the greatest tree-trunks or reach their tops by stairways?

"A famous poem contains the words, 'Over all the peaks is quiet, or peace.' In the din of the Great War an American paper printed this line with the added words, 'and nowhere else.' It read, 'Above all the peaks is quiet, and nowhere else.' Must we look forward to a time when the peace of this forest floor will disappear, and only above the summits will be rest? Or is it possible for us to develop the use of this place of wonders so as to preserve the influence of power and beauty, of grandeur and peace upon the human soul?"

State and county officials, members of the California State Park Commission, officers and members of the Save-the-Redwoods League, Redwood Empire Association, California State Chamber of Commerce, California Federation of Women's Clubs, Native Daughters of the Golden West, the Garden Club of America, American Legion, Humbolt County Board of Trade and Eureka Chamber of Commerce, and citizens of Humboldt County, as well as many visitors from outside of California, attended the ceremonies. Among the speakers at the main dedication, in addition to Dr. Merriam, were Chairman William E. Colby of the California State Park Commission, and Joseph D. Grant, chairman of the Board of Directors and vice-president of the Save-the-Redwoods League.

With the addition of the Bull Creek-Dyerville Park unit, the Humboldt State Redwood Park will extend for fifteen miles along the Redwood Highway north from Miranda, including the finest of the redwoods on both banks of the South Fork of the Eel River. It will extend four miles west, up Bull Creek, from the point where this stream joins the South Fork near Dyerville, 245 miles north of San Francisco. There will thus be a primary park area approximately four miles square.

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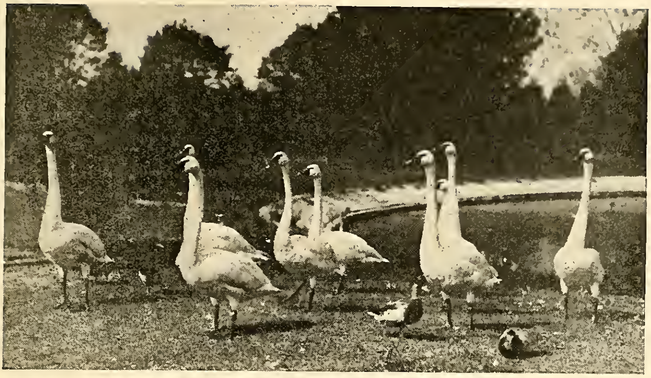

Wild native Whistling Swans at the Sanctuary.

SANCTUARY

By JACK MINER

(Reprinted by courtesy of "American Forests")

BIRDS of North America migrate from one country to another. A large number nest and raise their young and spend the spring and summer in Canada, but as fall approaches they fly to the southern regions of the United States. Therefore, as the birds are natives of no one country, there exists a migratory bird treaty between the United States and Canada which arbitrates laws so that all game birds on the continent that migrate are afforded equal protection in both countries.

It is now twenty-six years since I first noticed a decrease in the various species of birds on the continent, both among the song and insectiverous birds and also among game birds. When I began my investigation of the causes of the decrease in ducks and geese I found an answer in the increased number of hunters and the use of the automatic pump gun. Man appeared to be devoting too much time to the killing of game birds and not enough to their welfare and protection. Thus, I conceived the idea of starting a sanctuary, a place where birds would find shelter, food and protection from the guns of hunters. Not possessing wealth I was unable to build large ponds, but as I was engaged in the brick manufacturing business I turned one rather large clay pit into a lake, fenced it off, and posted my invitation to the birds.

I first purchased a pair of wild geese, clipped their wings, and placed them in the pond. Then I scattered corn around and sat back to see others swoop down. This was in 1904, and I continued to scatter corn until 1908 before there was any addition to the two geese I had placed there. That is how scarce wild geese were at that time. The first visit brought eleven geese, and these remained about eight weeks before they flew away. They returned the following year with twenty-two others, remaining eight weeks. In 1910 more than 300 dropped in to see me, while in 1911 there were so many that it was impossible to make any sort of count. To present some idea how many come each year since that time, it requires a fund of $10.000 every year to purchase food for them.

Thus the sanctuary idea, and the idea to artificially feed the waterfowl, has proved itself. After twenty-six years of work with it I am convinced of its success as a measure for the protection of birds.

Many people have accused me of "protecting birds to die of old age." This is far from the truth. My idea is simply to prevent extermination of ducks and geese—to provide for another generation the same enjoyment in these birds this and past generations have enjoyed. I am not in any measure opposed to a man shooting eight or ten ducks or two or three geese for food, but I am opposed to men going out and slaughtering game birds just for the sake of killing. A sanctuary does not take anything away from the hunter; rather it increases his chances.

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Fifteen years ago the beautiful white whistling swans were reduced to hundreds and were in danger of becoming extinct. The proper protective measures were taken and today there are more than 20,000 whistlers on the continent. Four years ago I visited Niagara Falls and found that these birds were being caught by the hundreds in death traps. It seems that on the waters of Lake Erie, fifteen miles above the falls, the swans go for their first northern migration, and it is here that they are trapped.

I discussed this deplorable practice with William Hill, better known as "Red" Hill, a riverman. He informed me that geese and ducks undoubtedly would have fallen prey to the traps had not my sanctuary up in Canada lured them away.

"I haven't seen a wild goose around here since you began drawing them to your ponds," he said.

"Then why can't I attract the swan away from the traps, Red?" I asked. "I've got several pair of swans to serve as decoys."

That was the beginning. Last summer more than 4,000 of these beautiful birds spent from a month to six weeks along the lake shore at Kingsville where the Government furnishes Royal Canadian Mounted Police to protect them both night and day.

Not only do ducks and geese find shelter on the sanctuary, but around the ponds have been planted several rows of evergreen trees which, while serving as a windbreak, shelter hundreds of song and insectiverous birds.

What pleases me most is that since my sanctuary has succeeded there have been hundreds started by the provincial and dominion governments of Canada. Too, in the United States countless hundreds have been established.

Whereever there are birds there must be a sanctuary, especially if man continues to dwell upon the slaughter, rather than protection.

Home of Audubon in New York City Faces Demolition

THE home of John James Audubon, naturalist, whose name has become so closely associated with the history of Louisiana, and of West Feliciana Parish, seems doomed to destruction, unless interested organizations throughout the country can raise the $25,000 needed to have it removed to a New York parkway.

The only real home that Audubon ever knew, a haven toward which he turned eagerly in his declining years, after a lifetime of hard wanderings, "Minnie's Land," is a rambling frame structure, overlooking the Hudson river, hemmed in on all sides by the towering buildings of Riverside Drive.

At the time of Audubon's residence there, the home was surrounded by rolling fields, and fronted on an open beach. Now it is almost hidden below the Riverside Drive viaduct, which spans the valley at this point. The present owner, who intends to use the site for building purposes, has given his consent to the moving of the historic structure, as have city officials. But to make this possible, $25,000 must be raised in record time.

PUBLIC APPEAL MADE

Heading a committee of Audubon admirers in New York city, who at a recent meeting voted to make a public appeal for funds, Reginald Pelham Bolton says that he has been promised the cooperation of Audubon societies throughout the country, and that contributions are being accepted by the National Association of Audubon Societies at their New York headquarters.

"We have the consent of the new owners to move the house to the recently opened park land, located to the west of Riverside Drive, at 161st street," Mr. Bolton said, "where it can be restored to its original condition, and preserved as a museum. But the needed money must be raised by November 24, or the structure will be lost to posterity."

At a recent meeting here of the Louisiana Historical Society a resolution of sympathy for the movement was passed, and members were asked to contribute to the cause.

LOVER OF LOUISIANA

A man whose love for nature almost amounted to a passion, Audubon spent many of his happiest days roaming the woods of Louisiana, acquainting himself with the native birds, sketching and gleaning information from every forest patch.

Born in Les Cayes, Santo Domingo, in 1785, his parentage has ever been the subject of dispute among historians, though present-day writers seem to agree that his father was Lieutenant Jean Audubon, his mother a Creole woman of whom little is known; that at the age of four he was taken to France by his father, where Lieutenant Audubon's wife, the former Anne Moynet, received him as her own son.

When Audubon was 18, he studied under Jaques Lous David, in Paris, and a year later journeyed to America to learn English, and enter a trade. Life immediately began to assume the

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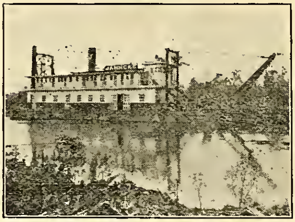

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aspect of a constant struggle for the young naturalist, with Audubon trying to adjust himself first to one trade then to another, and finding himself hopelessly unsuited to all of them.

In 1805 he walked from Philadelphia to New York, where he took ship for Paris, spending a year in France hunting birds with D'Orbigny. In 1808 he married Lucy Bakewell, and tried to adjust himself to the life of a storekeeper. But the love of nature was too strong within him, and so he decided to publish a book on ornithology. With this as his ultimate aim, he started down the Ohio and Mississippi rivers to New Orleans, to explore the surrounding country for birds.

PENNILESS ON ARRIVAL

On January 7, 1821, he arrived here penniless, and with no one to turn to. For months he lived from hand to mouth, supporting himself as best he could with fees collected from a few drawing pupils. Finally, Mrs. James Pirrie of West Feliciana, offered him the position of tutor to her daughter Eliza, a beautiful and talented girl of 17. Here Audubon remained for five months, until Eliza's fiance, a young physician, became so jealous of him he decided it was best to leave.

Returning to New Orleans, he became a drawing teacher, and studied birds with greater avidity. He was joined by his family, and the winter found them in dire straits. It was then that his wife showed herself as plucky as her husband, for she found work, first as governess to children in New Orleans, and later to members of the Percy family, for whom she started a private school at "Beechwood."

Audubon paid his passage to Natchez, Miss., by painting pictures of a boat captain and his wife. In that city, atop a bluff, he supported himself by teaching French, drawing, and dancing, and here it was that he received his first lessons in oils from John Stein, an itinerant portrait painter.

SCHOOL STARTED BY WIFE

Letters and journals of the period constantly refer to "Beechwood," where he and his wife lived, and where she started a school for the benefit not only of the Percy boys and girls but also of a limited number of children of wealthy neighbors. The parish of West Feliciana at this period was one of the richest cotton producing sections of the state, its carefree planters leading a life of ease and luxury.

Urged on by his desire to contribute something to the scientific world, Audubon decided to make a painting tour of the South, and walked part of the way to Louisville, paying for his food by painting panels on river boats, and even dabbling at street signs. In 1825 he returned to St. Francisville, where he taught dancing, until he earned money enough to pay his fare to Europe. And here, in 1826, he arranged for the publication of his first completed work, "Birds of America." Patrons were found. The plaudits of the world began to be heard. Audubon had come into his own.

His second work, "Habits of Birds in the United States," was followed by "Quadrupeds of North America," in three volumes. Audubon's last days found him living in comfort in his beautiful home on the Hudson, surrounded by his wife and two sons.

New Chief of Conservation

S. B. Locke, Associate Biologist, U. S. Biological Survey and Intermountain Forest and Range Experiment Station, an experienced outdoorsman, and a nationally known authority on game management, and forestry problems, has been appointed conservation director of the Izaak Walton League of America, according to an announcement made this week by M. K. Reckord, manager of the League.

Mr. Locke, a graduate of the University of Maine, has had 25 years field experience in studying forestry problems, and the development of game management programs in the U. S. forests, and the game fields of the United States. He is the author of numerous scientific articles on fish, game, and fur. He assumes his new duties with the League on December first.

Louisiana Business Men Sponsor Conservation Program on Air

During the month of September, a number of Louisiana merchants and dealers sponsored a radio program over station W. S. M. B., in which the activities of the Louisiana Conservation program were broadcasted daily for a period of thirty days.

The announcer was Mr. J. M. Seiferth who is known as the "Poet of Radioland."

Mr. Seiferth has compiled a very interesting collection of poems which he has broadcasted during the past year, entitled, "Memories of the Air," consisting of sixty-four pages of poems, philosophy, and quotations."

Living Creatures Carried by Crabs for Use as Clubs

Crabs that wear clothes, others that carry arms, and still others that march in vast numbers like soldiers, are among the curiosities of crustacean life just brought to the National Museum here, by Dr. Melbourne Ward, F. Z. S., Australian zoologist, who found them on the Great Barrier coral reef off the Australian coast.

Among the most curious is a tiny crustacean which forces the coral polyp to build a limestone palace for its abode. The female of this species, Dr. Ward explains, lodges on the coral, when in a larval state, and causes an irritation which leads the host animal to build up the limestone walls. The resulting house is just large enough for the crab to move about in comfortably. There is always a door through which she obtains food.

Another species merely sits on the end of a coral sprout which growing outward, makes a long, circular burrow for the animal. Through this it can move back and forth at will. The forward part of its body is enclosed in a hard shell of the exact color of the coral, so that when it sits at the door of its burrow to obtain food it is impossible to distinguish it. It completely closes the entrance to the burrow.

HANDS CARRY ANEMONE

But the most curious of all is the crab which carries two sea anemone, one in each hand, whereever it goes. In its first few months of life it seizes these anemone, also living animals, with stalks and disks like flowers, and which originally are attached to rocks under the water, about the middles of their stalks, and thenceforth sallies forth like a person carrying two umbrellas.

The most logical explanation of this behavior, Dr. Ward says, is that the anemone serve as weapons, killing or paralyzing small sea animals that come in contact with them. These then serve the crab as food. The species of anemone carried has stinging cells in its disc. These curious weapons are carried by the crab continuously, and seem essential to its life. When one of them is taken away the animal moves automatically to grab it again. When a crab is killed slowly in alcohol it clings to its weapons even in its death struggles.

Then there are the spider crabs, which cut and wear clothes. They have tiny hairs protruding through their shells. They cut sections on living sponges and place them on their backs. The sponge becomes entangled in the hairs and continues to grow, so that it protrudes for several inches over the back. Thin layers also cover the under parts of the body and legs.

MUST MAKE NEW SUIT

A closely related species cuts sections of sponges and carries them with its hind legs, so that they cover its body. Every time the crab sheds its shell it must make itself a new suit.

This practice, Dr. Ward explains, probably is beneficial to both animals. The crab, living in a forest of sponges, looks like a sponge itself, and thus is protected from its enemies. The sponge benefits by being carried to new food sources. When the shell is shed, the sponge simply attaches itself to a rock and continues growing.

One remarkable creature, described by Dr. Ward, is a degenerate type of barnacle which makes its way through the thin shell of one of the Barrier Reef crabs where a hair comes through. It wanders through the blood stream of the crab and finally comes to the surface, forming a little sac for itself. Here it is metamorphosed into another form and sends long, thread-like shoots into every part of the crab's body, except the vital organs, which it encircles without penetrating.

In some respects it is like a cancer among higher animals, except that in this case the "cancer" is an individual animal of another species. Thus it lives off the food eaten by the crab, but never kills nor apparently seriously injures its host. The one notable effect, for which no explanation is offered, is that it changes the male crab into a female in every respect.

SOLDIERS KEEP ORDER

The soldier crabs described by Dr. Ward are beach dwellers, about two inches long including their legs. They "march" over the hard sand in perfect order, apparently as if they were under the control of leaders, although this has not been ascertained. When approached they burrow rapidly in "waves," like a regiment of infantry, first the front rank and then in order to the rear. The "army" disappears completely in a very short time.

Dr. Ward found that the soldier crabs could hardly be driven into the water. When he succeeded in pushing a few of them off the shore they were set upon by a ferocious variety of small fish, which rapidly devoured them. Realization of this danger apparently is instinctive in the animal.

Some of the land-dwelling crabs of the mudflats, he found, dig very intricate burrows, with labyrinthine cross and side gallaries. Some species live a communal life. Each crab has his own burrow, but each has a passage leading to a large, central hall, which seems to be a community gathering place. Others are intensely individualistic. Each crab builds an elaborate laybrinth under the mud, considers it his own home, and vigorously defends it.

The doctor made many observations of the courtship of the mud-dwelling crabs, some species of which have dances resembling the love dances of birds. The females are usually smaller than the males. The male of one variety, after having won a mate by the attraction of his dancing, picks her up bodily in one of his nippers and carries her away.

The curious behavior of these creatures, some hitherto unknown to science, approaches in some ways that of certain insect varieties, of which they are close relatives, explains Dr. Ward, and is not to be considered as the outcome of any reflection on the part of individuals.

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Study of Waste Gases Leads to Rich By-product

Pacific Experiment Station Research to Eliminate Sulphur Fumes Brought Discovery of New Chemicals

Most ores contain sulphur which is released from the metal during the smelting operation as the oxide, sulphur dioxide, a gas of extremely penetrating and irritating properties, even in great dilution. Certain harmful fumes, such as those from arsenic, are also produced. Twenty years ago many complaints and lawsuits were being brought against the smelters, by the farmers on the surrounding land, because of damage to their crops and stock from such gases and fumes discharged from the treatment plants.

The Pacific Experiment Station was organized to obtain a solution of this problem. The success of its program is evidenced by the present lack of notable difficulty of this kind. Its results, however, were not entirely humanitarian, for by the methods developed, by-products were secured sfficient to more than pay for the additional treatment. As an immediate result, one of the biggest smelters in the west promptly installed a plant to make sulphuric acid from the objectionable sulphur dioxide gas. An immense installation of Cottrell electrical preciptators was added to catch the fumes and dust, from which valuable materials, such as arsenic, were recovered.

Even in these early days, the Pacific Experiment Station realized the importance of fundamentals, and the attack on this problem was from such a viewpoint. The behavior of important metallic ores during roasting was determined, including many of the more abstract properties previously discussed, in order to find the smelting conditions under which the production of objectionable fumes might be controlled. All of such data contributed to the final, practical results, which are well known today.

The foregoing is typical of the work which the Pacific Experiment Station has accomplished. Other important investigations have included a study of anhydrous aluminum chloride, the metallurgy of quicksilver, the fundamental physics and chemistry of the chloride volatilization process, the critical study of equilibria in the various iron-oxide systems, the production of plastic magnesia from crystalline magnesite (previously amorphous material had been considered necessary), purification of copper solutions, the fundamentals of the ferric sulphate-sulphuric acid process for extraction of copper from low-grade ores (the Southwest Experimental Station, Tuscon, Ariz., worked on the engineering phase), acid extraction of alumina from clay, alunite and other aluminous material, the time of passage of particles through rotary kilns, etc.

The Pacific Experiment Station of the United States Bureau of Mines was established as a smelter-fume labratory early in 1911. Its first home was in the new Custom House Building, San Francisco, Calif., with a small laboratory in the adjacent old Appraiser's Building. These quarters were turned over to the petroleum work of the United States Bureau of Mines, when the metallurgical research was moved to the Palace of Mines of the Panama-Pacific Exposition, held in San Francisco in 1915. After the exposition, in the fall of 1915 and the spring of 1916, the Pacific Experiment Station moved its headquarters to a suite of rooms in the new mining building, on the campus of the University of California at Berkeley, in which it is still quartered.

For the first five years of its existence, the Pacific Experiment Station devoted its entire energies to the problem of elimination through utilization of obnoxious smelter fumes. This suggested the next problem undertaken—namely, the recovery of the mercury fumes being lost in the exit gases from quicksilver plants—which in turn led into a study of the general metallurgy of quicksilver, a problem on which this station has worked intermittently as occasion demanded. For a period of a few years the personnel of the station studied a number of miscellaneous problems previously mentioned. Through all this time, however, the fundamentals behind various investigations being conducted at other stations were being referred to Berkeley, until in 1923 and 1924 this type of work gradually crowded out all other investigations.

FORESTRY'S RELATION TO PUBLIC WELFARE

(*Continued from page 27*)

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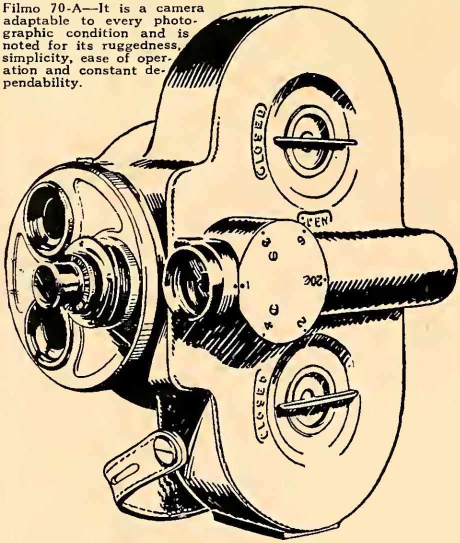

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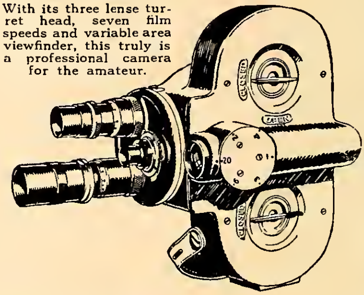

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